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INTERIM REPORT NO. 14

IPD 310-14

Project

NPCP-89-NADC-002

"THE APPLICABILITY OF PATENTED TECHNOLOGIES TO SONOBUOYS" (U)

Prepared For:

DEPARTMENT OF THE NAVY

NAVAL AIR DEVELOPMENT CENTER

Office of Associate Director
for Technology
(Code 01-B)

and

Acoustics Development Division
(Code 504)
Warminster, PA 18974

INTELLECTUAL PROPERTY DYNAMICS

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

NADC has the responsibility for executing and sponsoring R&D projects to build on the Navy's Technology base for improved ASW systems.

The objective of project NPCP-89-NADC-002 is to provide information to support NADC's planning and management of future Sonobuoy development and acquisition programs. IPD tabulates Navy Requirements and conducts a computerized search, analysis, and evaluation of U.S. patented inventions which offer promise towards improving the design of future Sonobuoys.

IPD contacts the owners of the selected inventions to determine the current status of the invention, and the owners' suggested path to implementing the inventions in terms of Navy Requirements.

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22a. NAME OF RESPONSIBLE INDIVIDUAL: J. B. Polin, NPCP Coordinator	22b. TELEPHONE (Include Area Code): (215) 441-2316; 22c. OFFICE SYMBOL: Code 01-B

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FOREWORD

* * * * *

This is the fourteenth Quarterly Report prepared by Intellectual Property Dynamics (IPD) for NADC under Project NICRAD-83-NADC-001, dated 18 January 1983; NICRAD-85-NADC-008, dated 18 January 1986; and renewed under NPCP-NADC-89-002, dated 31 January 1989. This report details our research findings from 01 April to 30 June 1989, our planned effort for NADC during the next quarterly period.

NADC manages and sponsors numerous R&D programs aimed at improving and updating existing Sonobuoy systems technologies for the Naval Air Systems Command in response to CNO Operational Requirements. These programs detail scores of ASW systems problems that currently fall short of meeting the Navy's needs. Therefore, NADC is actively seeking advanced concepts to solve scientific or engineering problems by stimulating technological innovation in the private sector.

IPD's effort is comprised of a computer-assisted search and analysis of recently patented inventions issued by the U.S. Patent and Trademark Office; more specifically, we select, examine, and rank the inventions according to their potential cost-benefits to the design of future Sonobuoys.

Our first step is to identify key areas of discrepency between current systems design and ideal Requirements as specified by the U.S. Navy for future Sonobuoys; then, through massive database searches, we peruse recently patented inventions for any technology that may apply to design problems. From several hundred initial candidates, IPD selects only a few inventions which have the highest relevance to the project.

Finally, our findings and Recommendations for each invention's utilization in the next generation Sonobuoy design, and a copy of the cover page of each "Most applicable" patent, are presented in each of our Quarterly Interim Reports to NADC.

In addition, IPD locates and contacts the owners/inventors of our "Most" relevant candidates. Expert on the current development status of their inventions, these individuals may prove invaluable as consultants to the Navy in the progress of future Sonobuoy design.

In summary, IPD helps close the gap between current Navy Requirements and future Sonobuoy systems design by locating the technical expertise to assist in implementing selected patented inventions, and supports NADC's effort to determine whether feasibility has been established ... and in fact, if functional models are available.

A - PROGRESS (Item 25 of DD Form 1498)
01 March - 30 June 1989

1. Thirty-one (31) U.S. patents have been selected "Most applicable" to the design of future Sonobuoys.

2. During this Quarterlty Interim Report period, IPD contacted the Attorney-of-record of each of the selected "Most" applicable U.S. patents issued since July 1983.

3. IPD has posted twelve (12) potential R & D sources.

5. Total IPD man-hours to date = 1025.0

6. Total IPD mainframe computer costs to date = $4,950.00.

B - PLANS for NEXT THREE-MONTH PERIOD

1. Contacts will be made with the Attorneys-of-record, from whom replies have not been received for the selected "Most applicable" patented inventions (see: SECTION VIII hereof), in order to determine current status, amount of further development needed, and availability of the patented technology for Sonobuoy applications.

2. A new series of searches will be undertaken to identify the latest inventions applicable to Sonobuoy functions listed in SECTION VI.

3. The most recent patented inventions issued in each functional category will be evaluated in terms of published Sonobuoy design Requirements.

C - RECOMMENDATIONS

The following assignees should be considered by NADC, as "NEW" sources for R&D on advanced Sonobuoy technologies:

1. Advanced Technology Laboratories, Incorporated
   13208 Northrup Way, Bellevue, WA 98005

2. Burr-Brown Research Corporation
   6730 South Tuscon Boulevard, Tuscon, AZ 85706

3. Federal Screw Works
   3401 Martin Avenue, Detroit, MI 48210

RECOMMENDATIONS (Cont'd)

4. International Computers, Ltd.
United Kingdom

5, Japan Victor Company
Chuo-Hu, Tokyo, 103, Japan

6. Matsushita Electric Industrial Company
1006 Oaza Kadoma Osaka, 571, Japan

7. Nippon Electric Company, Limited
Minato-ku, Tokyo, 108, Japan

8. Occidental Chemical Corporation
River Park, Darian, CT 06820

9. Poineer Electronics of America
1925 East Dominguez Street, Long Beach, CA 90810

10. Siemens (Corporation) AG
186 Wood Avenue South, Iselin, NJ 08830

11. Stanford, Leland Junior University
Stanford, CA 94305

12. Tokyo Shibaura Denki Kabushiki Kaisha
Kawasaki, Japan

Missing data will be included in subsequent Quarterly Reports as the data become available.

TABLE OF CONTENTS

* * * * *

I - INTRODUCTION

* * * * *

Since January 1983, IPD has been providing Technical Support Services to the Naval Air Development Center (NADC) to help NADC identify and implement more advanced and cost-effective ("affordable") technologies for the design of future Sonobuoys.

Over one million unexpired patents have been granted to over 6,000 national and international corporations, universities, Government agencies, and individual inventors by the U.S. Patent and Trademark Office (PTO), forming an extensive Technology Base. This rich inovative source ranges from fundamental concepts to advanced products and processes in every field of science, engineering, and manufacturing, with many of the technologies suitable for practical application.

The basic premise for IPD's effort as reported herein:

1. The Navy needs Intellectual Property Rights to support the management of its on-going Sonobuoy development programs.

2. Over one million unexpired U.S. patented inventions exist today of which over 500,000 are foreign owned.

3. Many new and useful ideas (and the sources) which could meet specified Navy Requirements, are selected, examined, and evaluated by IPD through an orderly process.

IPD's effort begins with a tabulation of Navy Requirements posted in NARDIC for the design of next generation Sonobuoys. We augment this analysis by obtaining data through the personal contact with key members of the Acoustics Development Division staff at NADC, who have all been most supportive in citing current Sonobuoy problem areas that require early improvement. See FIGURE 1 (1).

Our second step comprises an on-line computer search and evaluation of recently patented inventions (down to the components level) which support the tabulated Navy Requirements - inventions offering the greatest potential for improved performance and reduced cost of future Sonobuoys. See FIGURE 1 (2). Finally, we submit our Recommendations and a list of NEW potential R & D sources for Sonobuoy design improvements to NADC.

As IPD searches are limiuted to U.S. patented inventions that offer greatest cost-benefits to improved future Sonobuoy design performance, the inventions have been:

- issued since 1 July 1983 (Patent No. 4,400,000 or greater)

- assigned to private sector organizations and individuals.

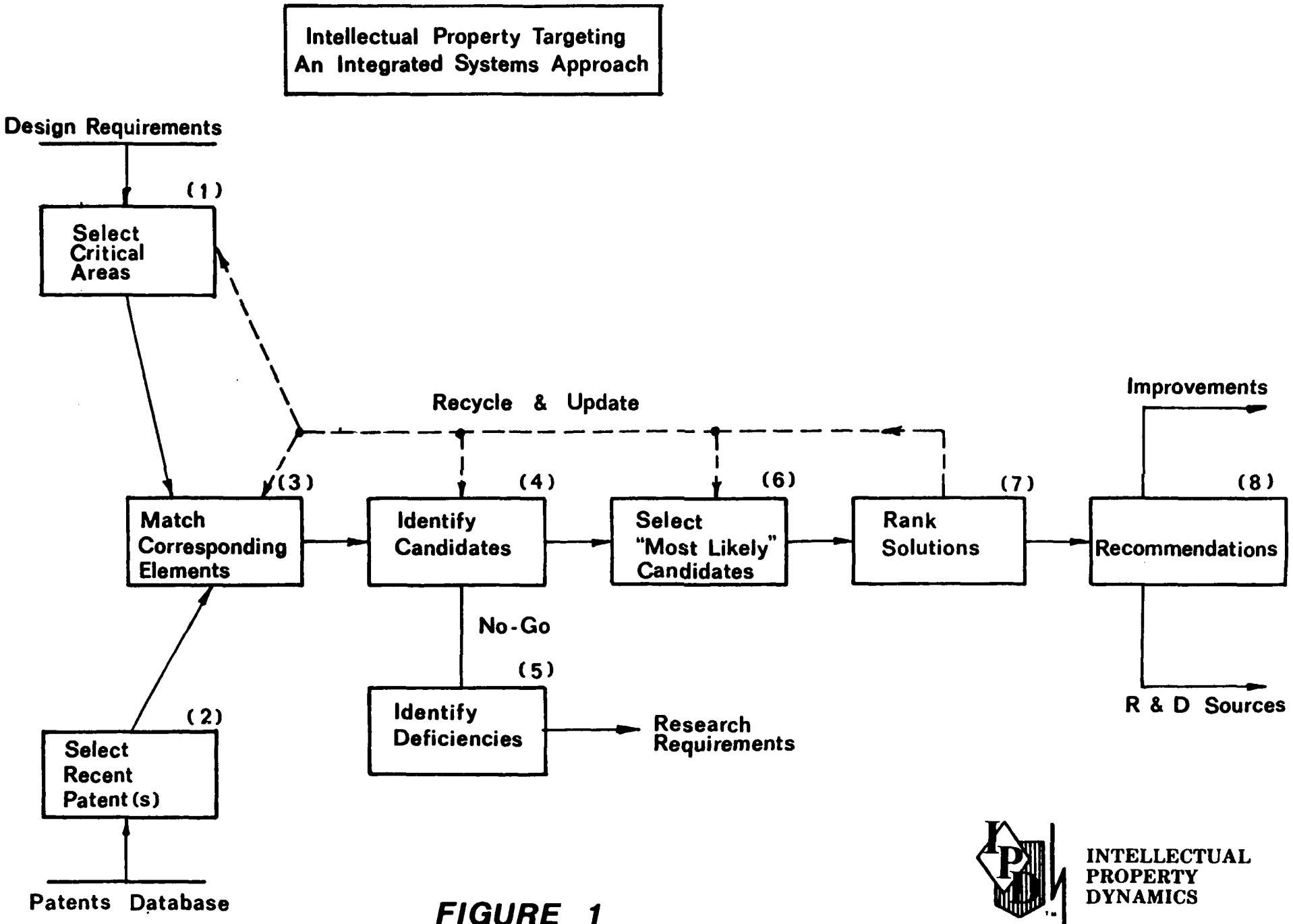


FIGURE 1

INTELLECTUAL PROPERTY DYNAMICS

II - METHODOLOGY

* * * * *

In searching for recent patented inventions, IPD uses the on-line "CLAIMS/U.S. Patents" database service, owned by IFI/Plenum Corporation; and Dialog Information Services, Inc. These databases provide access to 1.7 million records of U.S. patents issued from 1950 to the present, add some 1,400 new patent records weekly, and are readily accessed on-line when the following search criteria is used:

- Keywords in the title or abstract
- PTO classifications (over 400 Classes and 100,000 Sub-classes)
- Patent issue date
- Inventor and Assignee name(s).

IPD utilizes the Systems Approach - see FIGURE 1, and periodiacly updates the following logical steps:

(1) Identify Navy Requirements and critical areas needing early improvement.

(2) Select relevant U.S. patented inventions.

(3) Match the corresponding elements down to the componemts level.

(4) Identify candidates.

(5) Select the "Most likely" candidates.

(6) Rank the candidates (None, Marginal, Moderate, Most), in terms of the tabulated Requirements.

(7) Submit Recommendations to NADC, including (5) suggestions for remedial research.

An important element in IPD's effort is the development of new and more powerful methodologies to improve the effectiveness of our analysis and evaluation process.

IPD's approach is an iterative process (series of successive approximations), which lead to our RECOMMENDATIONS and list of "NEW" private sector R&D sources with a demonstrated capability in patented inventions for potential improvements in Sonobuoy design. Each re-cycle, update, or "cut" in our searches allows an improved definition of the interrelationship sensitivities between Navy Requirements and potential capabilities.

Copies of the "Most applicable" privately-owned patents are obtained from PTO, examined, and posted in SECTION VI hereof.

III - WORK PERFORMED

* * * * *

(01 April 1989 - 30 June 1989)

During this Quarterly Report period, IPD's effort included a complete updating of the U.S. patents selected for analysis. Thirty-one (31) U.S. patented inventions were selected as "Most applicable" to future Sonobuoys.

Channels-of-contact with each cited Attorney-of-record is continuing. See SECTION VIII.

The forty-six (46) key USPTO Classes and relevance to the design of future Sonobuoy designs listed in SECTION VI hereof are used to guide the further development of computer-assisted techniques for correlating U.S. Patent Office classes (and sub-classes) with the applicable National Supply Classifications (NSN) utilized by the U.S. Department of Defense.

IV - CONCLUSIONS

* * * * *

01 April 1989 - 30 June 1989

The thirty-one (31) "MOST applicable" U.S. patents are:

Patent No.	Owner	Group	Level	Rank
4,400,805	Rockwell Int'l	Transducer	Module	3
4,407,907	Toshiba Corp.	Processor	Module	3
4,419,657	Federal Screw Wk	Processor	Module	3
4,421,384	Sperry (Unisys)	Transducer	Module	3
4,423,494	Sperry (Unisys)	Transducer	Module	3
4,423,660	Raytheon Company	Deployment	Module	3
4,426,712	Mass. Inst. Tech	Processor	Module	3
4,449,210	Hughes Aircraft	Transducer	Module	3
4,464,130	Raytheon Company	Deployment	Module	3
4,474,685	Occidental Chem.	Structure	Material	3
4,482,937	Control Data Cor	Structure	Circuit	3
4,490,714	US Philips Corp.	Processor	Circuit	3
4,495,546	Matsushita Elect	Structure	Circuit	3
4,513,353	AMP, Incorporate	Structure	Circuit	3
4,531,095	Japan Victor Co.	Processor	Module	3
4,536,955	Int'l Computers	Structure	Circuit	3
4,542,076	Siemens AG	Structure	Material	3
4,542,653	Adv. Tech. Labs.	Transducer	Module	3
4,554,510	Litton Industr.	Processor	Circuit	3
4,590,590	Magnavox Company	Deployment	System	3
4,591,802	NEC Corporation	Processor	Circuit	3
4,600,915	Pioneer Electron	Processor	Circuit	3
4,634,997	AT&T Corporation	Receiver	Circuit	3
4,645,552	Hughes Aircraft	Structure	Circuit	3
4,651,132	Burr-Brown Corp.	Processor	Module	3
4,654,832	Magnavox Company	Deployment	System	3
4,661,938	Westinghouse	Transducer	Module	3
4,673,363	Sippican, Inc.	Structure	System	3
4,689,773	Magnovox Company	Structure	System	3
4,699,593	AMP, Incorporat	Structure	Circuit	3
4,750,147	Stanford Univers	Transducer	Module	3

The cover page for each of the above patents is presented in FIGURE 4 of this Report.

Most of the Attorneys-of-record IPD contacted go out-of-their-way to help locate invention status and availability information that we needed to complete SECTION VIII hereof.

MODERATE

Patent No.	Owner	Group	Level	Rank
4,407,903	Siemens AG	Power Source	Module	2
4,414,471	Sanders Assoc.	Transducer	Module	2
4,429,010	TDK Electronics	Processor	Module	2
4,433,315	General Electric	Processor	Circuit	2
4,441,200	Motorola, Inc.	Processor	Module	2
4,447,907	Motorola, Inc.	Transmitter	Circuit	2
4,454,763	Washington Res.F	Transducer	Module	2
4,459,679	Fujitsu, Ltd	Processor	Module	2
4,459,680	Fujitsu, Ltd.	Processor	Module	2
4,460,224	Burroughs Corp.	Structure	Circuit	2
4,461,025	Audiological Eng	Processor	Module	2
4,466,244	Jiun-tsong, Wu	Power Source	Module	2
4,468,758	Hitachi, Ltd.	Processor	Circuit	2
4,482,896	Motorola, Inc.	Processor	Module	2
4,484,158	General Electric	Processor	Circuit	2
4,487,821	Innovex OY	Power Source	Module	2
4,491,972	Motorola, Inc	Transmitter	Circuit	2
4,524,328	Toshiba Corp.	Processor	Module	2
4,564,843	Cooper, Charles	Antenna	Module	2
4,574,248	Rockwell Int'l	Transmitter	Module	2
4,606,039	SNECMA, France	Processor	Circuit	2
4,626,976	Hitachi, Ltd.	Power Source	Module	2
4,628,426	General Electric	Power Source	Module	2
4,658,331	Tektronix, Inc.	Structure	Circuit	2
4,668,032	Harris Corp.	Structure	Circuit	2
4,700,173	Teac Corporation	Processor	Module	2
4,703,411	Brown-Boveri	Power Source	Ci: uit	2
4,733,597	Sparton Corp.	Deployment	Mc .e	2
4,733,720	Siemens AG	Power Source	Mo. le	2
4,747,084	Francias, ETAT	Power Source	Module	2
4,761,681	Texas Instrments	Structure	Circuit	2

31 Listed

MARGINAL

Patent No.	Owner	Group	Level	Rank
4,401,234	Universal Resch	Structure	Circuit	1
4,403,314	Thompson CSF	Transducer	Module	1
4,412,348	RCA Corporation	Transmitter	Module	1
4,422,106	Toshiba Corp.	Processor	Module	1
4,432,028	Honeywell-Bull	Processor	Module	1
4,434,445	US Philips Corp.	Processor	Module	1
4,445,199	Fujitsu, Ltd.	Processor	Module	1
4,501,018	Motorola, In .	Receiver	Module	1
4,554,542	Motorola, In .	Processor	Module	1
4,571,510	Fujitsu, Lt	Processor	Circuit	1
4,670,885	Signatron, Inc.	Receiver	Circuit	1
4,742,382	Brown-Boveri	Power Source	Component	1

12 Listed

V - FRAME OF REFERENCE

* * * * *

Sonobuoy Architecture

A. Statement of Functions

The overall function of a Sonobuoy is to sense and translate acoustic and/or other undersea data, and to transfer such data via a suitable communication link to a receiver located above the air/sea interface. The undersea sensing mode can be active or passive.

Sonobuoys are also used to detect, classify, determine direction of movement, and report on surface vessel activity. Sonobuoys can be used to intercept and record time and signature data from aerospace radiating sources during overflights of the operating area. Such data could be stored and later made available on command via the Sonobuoy uplink.

Moreover, Sonobuoys can be used to provide communication channels between submmerged vehicles and platforms located above the air/sea interface. And oil prospectors have used hard-wired "Sonobuoys" dipped in well holes for years.

The primary non-acoustic sensors include: Magnetic Anamoly; Infrared detection; ELINT; Sea Thermal Gradients (Bathythermograph); and Electronic Countermeasures data for the Advanced Sonobuoy Communications Link (AN/ALQ-168 and AN/ARR-78).

Although most of the Navy's Sonobuoys currently utilize thirty-one (31) VHF channels, they are being replaced by ninety-nine (99) channel units; for instance, the AN/UYS-1 can process both analog and digital Sonobuoy signals.

The Sonobuoy Uplink is perhaps the most vulnerable element (to countermeasures) of the Sonobuoy system.

To enable an analysis of the applicability of patented inventions, the interrelationship of Sonobuoy functions has been compartmentalized into a hierarchy of functional subsets as shown in FIGURE 2. Each functional subset is analyzed independently, and patented invention candidates are selected and evaluated according to their applicability to each subset.

FIGURE 3 lists Sonobuoy module group functions and their Input/Output interrelationships.

IPD's approach systematically breaks the problem down into managable segments, which are then ammenable to analysis and evaluation.

SONOBUOY — Functional Block Diagram

INTELLECTUAL PROPERTY DYNAMICS

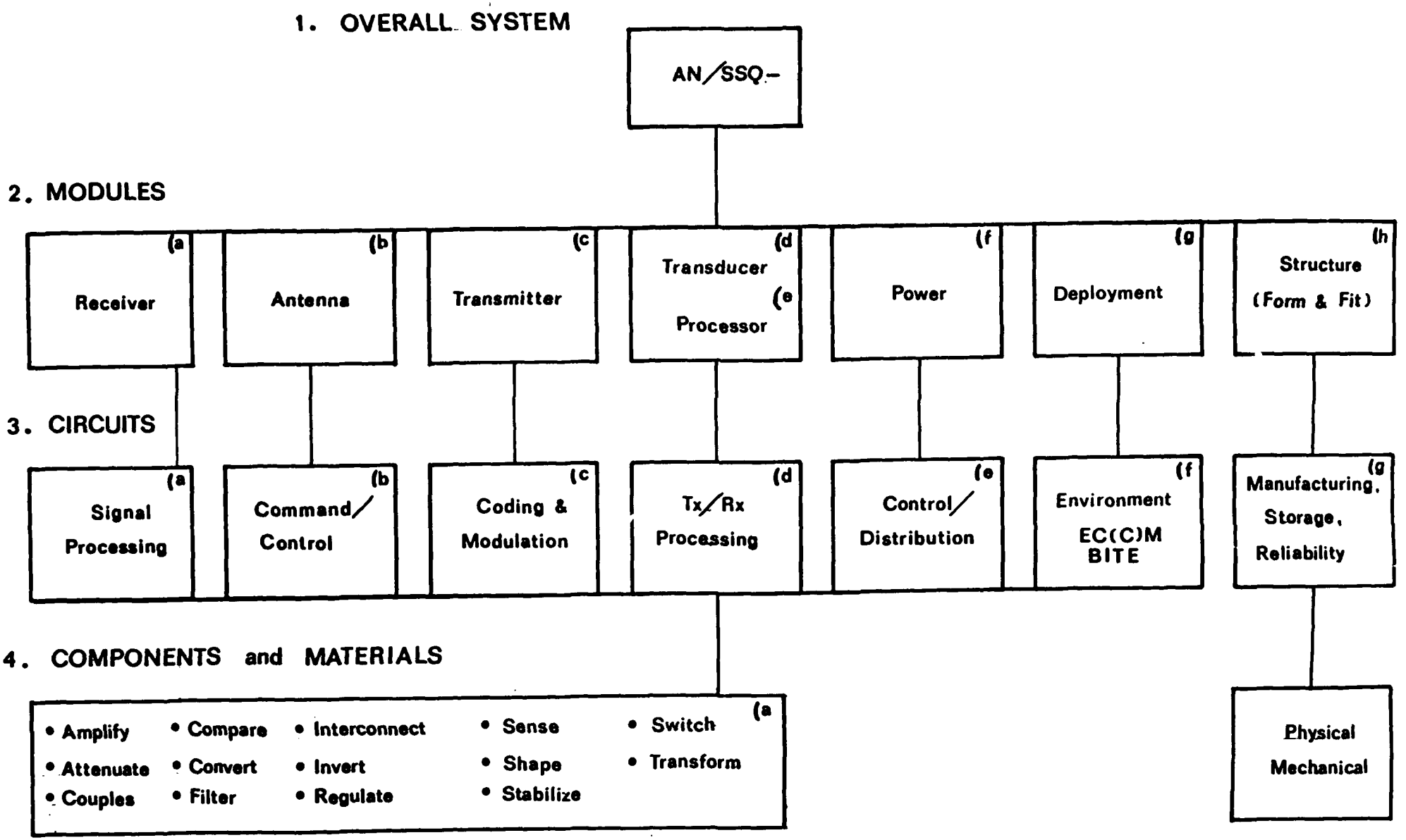


FIGURE NO. 2

SONOBUOY - GROUP FUNCTIONS

GROUP	INPUT	FUNCTION	OUTPUT
a) Receiver	VHF RF Envelope Command/ Control Signal & Noise.	Selects/Converts RF Envelope to Baseband & Consumes Power.	Baseband Control Signals.
b) Antenna	VHF EM Waves & Noise.	Couples EM Waves to Receiver/Transmitter.	EM Waves & Noise.
c) Transmitter	Baseband Signals.	Generates, Amplifies, Modulates RF Carrier & Consumes Power.	VHF RF Carrier.
d) Transducer	Undersea Data.	(*Transmitts undersea Data) Senses, Selects Data & Consumes Power.	Range, Bearing & Signature Data.
e) Processor	Baseband & Location Data.	Conversion, Logic/ Memory, Position Locating & Consumes Power.	Baseband Data.
f) Power Source	Energy.	Converts, Regulates & Distributes Power.	Power.
g) Deployment	Environment.	Positioning.	Availability/ Vulnerability.
h) Structure	Manufacture.	Form & Fit.	Size/Weight/Cost, & Reliability.

FIGURE 3

B. The following lists USPTO Classes as they relate to the Sonobuoy functional subsets presented in FIGURE 2:

PTO Class	Most likely use
018 - Plastics	2g
029 - Metal Working	2g
033 - Geometrical Instruments	2f
065 - Glass Manufacturing	4a
072 - Metal Deforming	2g
073 - Measuring & Testing	3f
074 - Machine Elements & Mechanisms	4b
075 - Metallurgy	4
140 - Wireworking	4a
148 - Metal Treatment	4b
174 - Electricity, Conductors & Insulators	2e
181 - Acoustics	4a
204 - Chemistry, Electrical & Wave Energy	4a
234 - Selective Cutting	4b
235 - Registers	3d
242 - Winding and Reeling	3a
264 - Article Shaping (Non-metallic)	4
274 - Sound Recording and Reproducing	3a
307 - Electrical Transmission & Interconnect	3e
320 - Battery & Condenser Charging/Discharging	3e
321 - Electricity, Conversion Systems	3e
324 - Electricity, Measuring & Testing	3f
325 - Modulated Carrier Communication Systems	2c
328 - Miscellaneous Electronic Circuitry	3
329 - Demodulators & Detectors	3a
330 - Amplifiers	4a
331 - Oscillators	4a
332 - Modulators	3c
335 - Magnetically Operated Switches	4a
336 - Inductors	4a
338 - Resistors	4a
339 - Connectors	4a
340 - Electrical Communications	2
343 - Radio Communications	2
346 - Recorders	3d
350 - Optics, Systems & Elements	4a
357 - Active Solid State Devices	4a
360 - Dynamic Magnetic Information Storage & Retrieval	3d
361 - Electricity, Electrical Systems & Devices	3e
364 - Computers & Data Processing	3d
367 - Acoustic Wave Systems & Devices	2d
371 - Error Detection/Correction	3d
375 - Pulse/Digital Communications	3d
428 - Recording Medium	3d
429 - Chemistry, Elec. Current Producing Apparatus	4
455 - Telecommunications & Electronic Countermeasures	3f

VI - CANDIDATE PATENTED INVENTIONS
(Applicable to Sonobuoys)

* * * * *

1. OVERALL (Sonobuoy) SYSTEM Level:

4,689,773 4,673,363

2. MODULE Level:

a) RF Receiver:

4,501,018

b) Antenna:

4,564,843

c) RF Transmitter:

4,574,248 4,574,248

d) Transducer:

4,400,805	4,403,314	4,414,471
4,421,384	4,423,494	4,449,210
4,454,763	4,542,653	4,661,938
4,750,147		

e) Processor:

4,407,907	4,419,657	4,422,106
4,426,712	4,429,010	4,432,028
4,434,445	4,441,200	4,445,199
4,459,679	4,459,680	4,461,025
4,482,896	4,524,328	4,531,095
4,554,542	4,651,132	4,700,173

f) Power Source:

4,407,903	4,466,244	4,487,821
4,626,976	4,628,426	4,733,720
4,747,084		

g) Deployment:

4,423,660 4,464,130 4,590,590

4,733,597

h) Structure:

3. CIRCUIT Level:

a) RF Receiver:

4,634,997 4,670,885

b) Antenna:

c) RF Transmitter:

4,447,907 4,491,972

d) Tramsducer:

e) Processor:

4,433,315 4,468,758 4,484,158
4,490,714 4,554,510 4,571,510
4,591,802 4,600,915 4,606,039

f) Power Source:

4,703,411

g) Structure:

4,401,234 4,460,224 4,482,937
4,495,546 4,513,353 4,536,955
4,645,552 4,658,331 4,668,032
4,699,593 4,761,681

5. COMPONENTS and MATERIALS Level:

a) Electrical Functions:

- Amplify:
- Attenuate (Shielding/RFI):
- Couple:
- Compare (Logic):
- Convert: (A/D - D/A)
- Filter (RF):
- Invert:
- Memory:
- Regulate (DC):

  4,742,382

- Sense:
- Shape:
- Stabilize:
- Switch (Signal):
- Transform (Signal):

b) Physical/Mechanical Structure:

4,474,685 4,542,074

VII - ASSIGNEES

* * * * *

The following organizations and individuals (assignees) own the patents selected for in-depth analysis:

AMP, Inc.
AT&T Corp.
Adv. Tech. Labs.
Audiological Eng
Bender, Roland A.
Brown-Boveri
Burr-Brown Corp.
Burroughs Corp.
Control Data
Cooper, Charles
Federal Screw Wk
Francais, ETAT
Fujitsu, Ltd.
General Electric
Harris Corp.
Hitachi, Ltd.
Honeywell-Bull
Hughes Aircraft
Innovex OY
Int'l Computer
Japan Victor Co.
Jiun-tsong, Wu
Mass. Inst. Tech.
Magnovox Company
Matsushita Elect
Motorola, Inc.
NEC Corporation
Occidental Chem.
Pioneer Electron
RCA Corporation
Raytheon Company
Rockwell Int'l.
SNECMA, France
Sanders Assoc.
Siemens AG
Signatron, Inc.
Sippican, Inc.
Sparton Corp.
Sperry Corp.
Stanford, Leland
TDK Electronics
Teac Corporation
Tektronix, Inc.
Texas Instrments
Thompson CSF
Tokyo Shibura
Toshiba Corp.
U. S. Philips Corp.
Universal Resch.
Washington Res,F
Westinghouse Electric

51 Listed

VIII - BENEFITS OF THE MOST LIKELY CANDIDATES

Patent No.	Owner:	Expires:
4,400,805 Nadler	Rockwell, Int'l	23 Aug 00

A. Description of Invention: Narrow bandwidth acoustic transducer.

B. Main Advantages: Can achieve resonance at a predetermined acoustic wave frequency.

C. Main Application(s) in Sonobuoys: For communications between submarines and above surface platforms.

D. Further Development Needed: The technology was developed of primary applications other than Sonobuoy designs. Owner has pursued alternative approaches related to Sonobuoy designs.

E. Availability: Unknown.

F. Contact: George A. Montayne, Esquire
Senior Patent Counsel, Electronics Operations
Rockwell International Corporation
3370 Miraloma Avenue
Anaheim, CA 92803 (714) 632-1663
030

Patent No.	Owner:	Expires:
4,407,907 Takamura, et al	Toshiba Corporation	01 Oct 00

A. Description of Invention: Air electrode fuel cell.

B. Main Advantages: Cell is capable of preventing fuel leakage under heavy duty discharge conditions.

C. Main Application(s) in Sonobuoys: Long shelf life with a high discharge current capability.

D. Further Development Needed: Advanced Development to support commercial production.

E. Availability: Owner is prepared to grant a non-exclusive license under mutually acceptable terms and conditions. However, owner is not in position to provide supporting technical know-how.

F. Contact: S. Yamashita
Senior Manager
Licensing and Joint Venture Agreements
1-1, Shibaura 1-Chome
Minato-Ku, Tokyo, 105 Japan (03) 457-
958

Patent No.	Owner:	Expires:
4,419,657 Gagnon	Federal Screw Works	06 Dec 00

A. Description of Invention: Audio signal digitization coder/decoder.

B. Main Advantages: The circuitry provides improved signal-to-noise over the audio spectrum with wide dynamic range.

C. Main Application(s) in Sonobuoys: Digitization of hydrophone baseband signals.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Don K. Harness, Esquire
Harness, Dickey & Pierce
1500 North Woodward
Birmingham, MI 48011 (313) 642-7000

Patent No.	Owner:	Expires:
4,421,384 McMahon	Sperry (Unisys)	20 Dec 00

A. Description of Invention: Fiber optic acoustic transducer.

B. Main Advantages: Allows coupling of sensor data to the Sonobuoy transmitter via fiber optic cable thus negating the need for deeply submerged electronics.

C. Main Application(s) in Sonobuoys: For high sensitivity detection in underwater target locating systems.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Seymour Levine, Esquire
Patents & Licensing
Unisys Corporation
Lakeville Road & Marcus Avenue
Great Neck NY 11020 (516) 574-3061

034

Patent No.	Owner:	Expires:
4,423,494 Groves, et al	Sperry (Unisys)	27 Dec 00

A. Description of Invention: Beam steerable sonar array.

B. Main Advantages: Azmuth steerage by electrical means.

C. Main Application(s) in Sonobuoys: Acoustic beam forming.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Seymour Levine, Esquire
Patents & Licensing
Unisys Corporation
Lakeville Road & Marcus Avenue
Great Neck NY 11020 (516) 574-3061

034

Patent No.	Owner:	Expires:
4,423,660 Ouellette	Raytheon Company	03 Jan 01

A. Description of Invention: Retainer Latching Mechanism.

B. Main Advantages: Assures deployment of the parachute after the Sonobuoy has been ejected from launching tube.

C. Main Application(s) in Sonobuoys: Deployment

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Richard M. Sharkansy, Esquire
Patent Counsel,
Raytheon Company
100 Hayden Avenue
Lexington, MA 02173 (617) 860-4827

095

Patent No.	Owner:	Expires:
4,426,712 Gorski-Popiel	Mass. Inst. Tech.	17 Jan 01

A. Description of Invention: A digital correlation receiver for GPS.

B. Main Advantages: Simplicity, due to reduced synchronization and clocking requirements. Provides 8-channel parallel capacity with improved margin against fades.

C. Main Application(s) in Sonobuoys: Circuitry is ammenable to integrated circuit design.

D. Further Development Needed: MIT could build one for about $10K.

E. Availability: Owner would license under mutually acceptable terms and conditions.

F. Contact: George Gorski-Popiel
Massachusetts Institute of Technology
244 Woods Street
Lexington, MA 02173 (617) 981-4188

172

Patent No.	Owner:	Expires:
4,449,210 Myer	Hughes Aircraft	15 May 01

A. Description of Invention: A fiber optic hydrophone transducer for detecting the magnitude and direction of applied acoustic signals.

B. Main Advantages: Low power consumption and improved reliability.

C. Main Application(s) in Sonobuoys: Deeply submerged acoustic wave detection.

D. Further Development Needed: Considerable engineering work is needed to implement the technique for Sonobouys, including the development of a stable fixture.

E. Availability: Unknown (at present)

F. Contact: Ms. V. D. Duraiswamy
Senior Patent Attorney
Hughes Aircraft Company
7200 Hughes Terrace
PO Box 45066
Los Angeles, CA 90045 (213) 568-6076

052

Patent No.	Owner:	Expires:
4,464,130 Ouellette al	Raytheon Company	07 Aug 01

A. Description of Invention: Sonobuoy depth selector.

B. Main Advantages: Cable payout to predetermined cable lengths.

C. Main Application(s) in Sonobuoys: Transducer depth selection and control.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Richard M. Sharkansy, Esquire
Patent Counsel
Raytheon Company
100 Hayden Avenue
Lexington, MA 02173 (617) 860-4827

095

Patent No.	Owner:	Expires:
4,474,685 Annis	Occidental Chemical	02 Oct 01

A. Description of Invention: Electroconductive molding compositions for EMI shielding.

B. Main Advantages: Constant attenuation of 20db over the range of 0.5 to 1000 Mhz, and easily molded.

C. Main Application(s) in Sonobuoys: Component shielding.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: James F. Tao, Esquire
Patent Counsel
Occidental Chemical Corporation
PO Box 189
Niagara Falls, NY 14302 (716) 773-8432

Patent No.	Owner:	Expires:
4,482,937 Berg	Control Data Corp.	13 Nov 01

A. Description of Invention: Board-to-Board Interconnect Structure.

B. Main Advantages: Cost saving in circuit board stacking and indexing.

C. Main Application(s) in Sonobuoys: Electronic circuit packaging.

D. Further Development Needed: Production tooling was built and the invention reached early production. Then, the program was cancelled. It would be necessary to get the tooling together once again.

E. Availability: Owner may be willing to license the invention to a manufacturer.

F. Contact: Richard E. Billion, Esquire
Patent Counsel
Computer Systems and Services Division
Control Data Corporation
8100 34th Street
Minneapolis, MN 55440-4700 (612) 853-3267

370

Patent No.	Owner:	Expires:
4,490,714 De Plassche, et al	U.S. Philips Corp.	25 Dec 01

A. Description of Invention: D/A converter for bipolar signals.

B. Main Advantages: Improved Signal/Noise of bipolar audio signal transmission.

C. Main Application(s) in Sonobuoys: In airborne receiver of PCM audio signals.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Thomas A. Briody, Esquire
Patent Counsel
U.S. Philips Corporation
580 White Plains Road
White Plains, NY 10591 (914) 332-0222

007

Patent No.	Owner:	Expires:
4,495,546 Tseneshi, et al	Matsushita Elec.	22 Jan 02

A. Description of Invention: Method of mounting hybrid Integrated circuits on flexible mother boards.

B. Main Advantages: Provides a hybrid integrated circuit component best suited for compact and light weight electronic equipment.

C. Main Application(s) in Sonobuoys: High density circuitry.

D. Further Development Needed: Technology is used in commercial VTRs. Custom design needed for Sonobuoy applications.

E. Availability: Technology probably available through Licensing.

F. Contact: Vincent M. Creedon, Esquire
Wenderoth, Lind & Ponack
805 15th Street, MW - Suite 700
Washington, DC 20005 (202) 371-8850

Patent No.	Owner:	Expires:
4,513,353 Bakermans, et al	AMP, Incorporated	23 Apr 02

A. Description of Invention: A device for connecting leadless packages.

B. Main Advantages: Allows for fast, accurate alignment of contact surfaces during manufacture.

C. Main Application(s) in Sonobuoys: Fabrication of circuitry.

D. Further Development Needed: Unknown (at present)

E. Availability: Unknown (at present)

F. Contact: James M. Trygg, Esquire
Mail Stop 140-62
AMP, Incorporated
2109 Fulling Mill Road
Harrisburg, PA 17105 (717) 986-5472

055

Patent No.	Owner:	Expires:
4,531,095 Ishigaki, et al	Japan Victor Co.	23 Jul 02

A. Description of Invention: White noise immune noise reduction circuitry.

B. Main Advantages: When high-impulse noise reduction is required.

C. Main Application(s) in Sonobuoys: In hydrophone preamplifier stages.

D. Further Development Needed: Unknown (at present)

E. Availability: Unknown (at present)

F. Contact: Robert Lee Price, Esquire
Lowe, Price, Le Blanc, Becker & Shur
427 North Lee Street
Alexandria, VA 22320 (703) 684-1111

956

Patent No.	Owner:	Expires:
4,536,955 Gudgeon	Int'l Computers	27 Aug 02

A. Description of Invention: Integrated circuit mounting.

B. Main Advantages: Facilitates soldering and removal of Integrated Circuits from circuit boards. Also solves the thermal mismatch problem when mounting leedless ceramic packages to conventional circuit board materials.

C. Main Application(s) in Sonobuoys: Mounting of IC packages on a printed circuit board.

D. Further Development Needed: Development would be routine to any major connector manufacturer.

E. Availability: Owner is willing to license under reasonable terms and conditions.

F. Contact: D. C. Guyatt, Esquire
STC Patents
West Road
Harlow, Essex, CM20 2SH
England
0279 445991

cc: William M. Lee, Esq.
Lee & Smith, Chicago.

Patent No.	Owner:	Expires:
4,542,076	Siemens, AG	17 Sep 02
Bedmarz, et al		

A. Description of Invention: Shrinkable molded plastic component shielding.

B. Main Advantages: Cost saving.

C. Main Application(s) in Sonobuoys: Shielding of cable fittings.

D. Further Development Needed: Unknown (at present)

E. Availability: Siemens is prepared to grant a License under reasonable terms and conditions.

F. Contact: Jeffrey P. Morris, Esquire
IP Counsel
Intellectual Property Department
Siemens Corporation
186 Wood Avenue South
Iselin, NJ 08830 (201) 321-3930

011

Patent No.	Owner:	Expires:
4,542,653	Advanced Tech. Labs.	24 Sep 02
Liu		

A. Description of Invention: Beamforming Transmit/Receive Acoustic Transducer.

B. Main Advantages: Allows changing the effective element spacing between transmit and receive modes.

C. Main Application(s) in Sonobuoys: Active sonar transducer arrays.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Ms. Marcy Lynn Hikida
Associate General Counsel
Westmark International
22100 Bothell Highway, S.E.
PO Box 3003
Bothel, WA 98041-3003 (609) 921-4330

Patent No.	Owner:	Expires:
4,554,510 Shaw, et al	Lelend Stanford (Litton owns Rights)	19 Nov 02

A. Description of Invention: Bidirectional fiber optic amplifier.

B. Main Advantages: Wide bandwidth data transmission through fiber optics in both directions.

C. Main Application(s) in Sonobuoys: Two-way transmission of data between deeply-submerged transducer and surface electronics package.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Edmund W. Rusche, Jr., Esquire
Patent & Licensing Department - MS-30
Litton Industries, Incorporated
5000 Canoga Avenue
Woodland Hills, CA 91367 (818) 716-3138

291

Patent No.	Owner:	Expires:
4,590,590 Barker, et al	Magnavox (U.S. Philips Corp.)	20 May 03

A. Description of Invention: Sonobuoy float canister.

B. Main Advantages: Cable is payed-out for multiple depth transducer deployment.

C. Main Application(s) in Sonobuoys: Control of transducer depth.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Thomas A. Briody, Esquire
Patent Counsel
U.S. Philips Corporation
580 White Plains Road
Tarrytown, NY 10591 (914) 332-0222

007

Patent No.	Owner:	Expires:
4,591,802	NEC Corporation	27 May 03

A. Description of Invention: A multistage FET feedback audio amplifier.

B. Main Advantages: Fewer components, and improved low frequency amplifier response.

C. Main Application(s) in Sonobuoys: Component reduction.

D. Further Development Needed: Unknown (at Present)

E. Availability: Unknown (at Present)

F. Contact: Charles A. Laff, Esquire
Laff, Whitesel, Conte & Saret
Suite 2000
401 North Michigan Avenue
Chicago, IL 60611 (312) 649-0200

080

Patent No.	Owner:	Expires:
4,600,915 Yoshida	Pioneer Electronic Corporation	15 Jul 03

A. Description of Invention: Digital-to-Analog audio converter.

B. Main Advantages: Less costly means for D/A conversion of audio PCM signals.

C. Main Application(s) in Sonobuoys: In airborne receiver of Sonobuoy PCM radiated signals.

D. Further Development Needed: Pioneer has not developed the invention of its patent, except to the extent of filing a patent application, and not certain at this juncture. is the extent of further development necessary to bring the invention to practical application.

E. Availability: Pioneer would be interested in licensing its patent to to Navy suppliers.

F. Contact: Darryl Mexic, Esquire
Patent Counsel
Sughrue, Mion, Zinn, Macpeak & Seas
2100 Pennsylvania Avenue, NW
Washington, DC 20037-3202 (202) 663-7909

949

Patent No.	Owner:	Expires:
4,634,997 Tompsett, et al	AT&T Corporation	06 Jan 04

A. Description of Invention: Digital automatic gain control circuit.

B. Main Advantages: Receiver output can be held essentially constant during wide variations of received signal amplitude.

C. Main Application(s) in Sonobuoys: Command-control receiver section.

D. Further Development Needed: Unknown (at present)

E. Availability: Awiating Owner's reply.

F. Contact: David I. Caplan, Esquire
Patent Attorney
Room 3B-521
AT&T Bell Laboratories
600 Mountain Avenue
Murray Hill, NJ 07974 (201) 582-4937

006

Patent No.	Owner:	Expires:
4,645,552 Brown, et al	Hughes Aircraft	24 Feb 00

A. Description of Invention: Dimensionally stable ceramic interconnect boards.

B. Main Advantages: Component assembly and passivation at low cost.

C. Main Application(s) in Sonobuoys: Multilayer Component assembly production.

D. Further Development Needed: None. Now ready for production. (Was used successfully by Hughes in the "AMRAAM" Missile system.)

E. Availability: Hughes could produce boards to meet Navy Sonobuoy Requirements.

F. Contact: Stanley M. Stuhlbarg,
Manager, Advanced Programs
Hughes Aircraft Company
500 Superior Avenue - Bldg 700
Newport Beach, CA 92663 (714) 759-2854

052

Patent No.	Owner:	Expires:
4,651,132 Lillis, et al	Burr-Brown Corp.	28 Jan 03

A. Description of Invention: Analog-to-Digital PCM Converter.

B. Main Advantages: High-speed, Low-noise, Low-distortion A/D coding/decoding of audio signals.

C. Main Application(s) in Sonobuoys: Improved transmission of audio signals.

D. Further Development Needed: None. Already incorporated into a standard Burr-Brown audio product.

E. Availability: Owner would entertain an offer to license.

F. Contact: Harry M. Weiss, Esquire
Attorney-at-Law
4204 North Brown Avenue
Scottsdale, AZ 85251 (602) 994-8888

Patent No.	Owner:	Expires:
4,654,832 Barker	Magnavox (U.S. Philips Corp.)	31 Mar 04

A. Description of Invention: Sonobuoy retaining and release device.

B. Main Advantages: Improved Sonobuoy deployment at air/sea interface.

C. Main Application(s) in Sonobuoys: Parachute ejection after launch.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Thomas A. Briody, Esquire
Patent Counsel
U.S. Philips Corporation
580 White Plains Road
Tarrytown, NY 10591 (914) 332-0222

007

Patent No.	Owner:	Expires:
4,661,938 Jones	Westinghouse (Oceanic Division)	28 Apr 04

A. Description of Invention: Passive Sonar Beamforming Transducer.

B. Main Advantages: Provides rapid switching for azimuth detection of multiple targets.

C. Main Application(s) in Sonobuoys: Directional sensing of acoustic sources

D. Further Development Needed: The sonar apparatus has been simulated on a computer but has never been built. The apparatus might be more expensive than a typical Sonobuoy.

E. Availability: Owner may license the invention to Navy suppliers.

F. Contact: Dean Schron, Esquire
Senior Counsel
Westinghouse Electric Corp.
Pittsburgh, PA 15235 (412) 256-5237

003

Patent No.	Owner:	Expires:
4,673,363 Hudson, et al	Sippican, Inc.	16 Jun 04

A. Description of Invention: Blow mold Sonobuoy module housing.

B. Main Advantages: A thermoplastic shell is quickly and economically formed around Sonobuoy modules.

C. Main Application(s) in Sonobuoys: Passivation of Sonobuoy modules.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Alan T. Hudson
Sippican Incorporated
Seven Barnabas Road
Marion, MA 02738-1499 (617) 748-1160

Patent No.	Owner:	Expires:
4,689,773 Congdon, et al	Magnavox (U. S. Philips Corp.)	25 Aug 04

A. Description of Invention: Slidably mounted Sonobuoy components.

B. Main Advantages: Provides a predetermined spacing between Sonobuoy functional sections.

C. Main Application(s) in Sonobuoys: Pre-deployment space-saving.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: Thomas A. Briody, Esquire
Patent Counsel
U. S. Philips Corporation
580 White Plains Road
Tarrytown, NY 10591 (914) 332-0222

007

Patent No.	Owner:	Expires:
4,699,593 Grabbe, et al	Amp, Incorporated	13 Oct 04

A. Description of Invention: Connector for a substrate such as an Integrated Circuit.

B. Main Advantages: An improved connector with a plurality of contact modules with high numbers of contact positions.

C. Main Application(s) in Sonobuoys: Production of complex circuits involving Integrated Circuits.

D. Further Development Needed: Unknown (at present)

E. Availability: Awaiting Owner's reply.

F. Contact: James M. Trygg, Esquire
Mail Stop 140-62
AMP, Incorporated
2109 Fulling Mill Road
Harrisburg, PA 17105 (717) 986-5472

055

Patent No.	Owner:	Expires:
4,750,147 Kailath, et al	Stanford University	07 Jun 05

A. Description of Invention: Sensor data processing of paired arrays, known as "ESPRIT"

B. Main Advantages: Sensor array and individual sensor characteristics need not be known. Computer simulations have demonstrated superior performance to other computationally practible alogrithms.

C. Main Application(s) in Sonobuoys: High-resolution direction finding/ target tracking

D. Further Development Needed: Controlled experiments should be conducted to ascertain the performance of the ESPRIT algorithms under various approximations.

E. Availability: Owner will affect appropriate technology transfer.

F. Contact: Richard H. Roy, Research Associate
Information Systems Laboratory
Electrical Engineering Department
Stanford University
Stanford, CA 94305 (415) 725-5698

IX - PATENT OWNER SURVEY

* * * * *

Experience has shown that the most responsive point-of-contact for obtaining information about the current status of a U.S. patented invention is the Attorney-of-Record cited on the front page of each patent.

Accordingly, IPD contacts the Attorneys by written request. We strive to improve our method of gathering timely information needed to ccmplete our Quarterly Reports to NADC. A sample IPD's request follows:

Re: U.S. Patent No. to et al.
(Cover page attached)

Dear Mr. :

Since January 1983, IPD has been under contract with the U.S. Naval Air Development Center (NADC) to identify recent U.S. patented inventions in the private sector which may offer improvements in the design of future Sonobuoys. IPD also recommends to the Navy R&D sources who could further develop these inventions to meet Navy Requirements.

NADC, an arm of the U.S. Naval Air Systems Command, sponsors and manages numerous R&D programs aimed at improving existing Surviellance Systems technologies, and continually looks to the private sector for advanced ideas.

IPD has selected the invention covered by the referenced U.S. patent as a candidate for further evaluation; therefore, we would appreciate if you would advise us as to:

1. The current stage of development of the invention.
2. The extent of further development needed to bring the invention to the point of practical application.
3. Your suggested path for implementing the invention in response to U.S. Navy Requirements.

Your brief reply will be gratefully appreciated, and please do not hesitate to call me if you have any questions.

Sincerely,

Richard Jenkins
Chairman

RJ:aa
Encl: (1)
f.-310

FIGURE 4 - MOST LIKELY CANDIDATES

* * * * *

Cover pages of the "Most applicable" patents selected from 01 April 1989 to 30 June 1989 follow.

United States Patent [19]

Nadler

[11] **4,400,805**

[45] **Aug. 23, 1983**

[54] **ACOUSTICALLY FILTERED TRANSDUCER**

[75] Inventor: **Harry Nadler, Thousand Oaks, Calif.**

[73] Assignee: **Rockwell International Corporation, El Segundo, Calif.**

[21] Appl. No.: **257,840**

[22] Filed: **Apr. 27, 1981**

[51] Int. Cl.³ H04R 1/28; H04R 17/10

[52] U.S. Cl. 367/140; 181/140; 367/149; 367/162; 367/176; 73/648

[58] Field of Search 367/13, 140, 149, 162, 367/163, 167, 172, 174, 176, 189; 310/322; 181/113, 160, 182, 122, 139, 140; 73/579, 648, 649

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,978,672	4/1961	Barney	367/172 X
3,219,970	11/1965	Sims	367/176 X
3,262,093	7/1966	Junger et al. .	
3,292,142	12/1966	Carson .	
3,466,924	9/1969	Roshon et al. .	
3,753,218	8/1973	Hill et al. .	
3,781,779	12/1973	Tallman .	
3,812,456	12/1973	Lane et al. .	
4,006,707	2/1977	Denslow	310/322

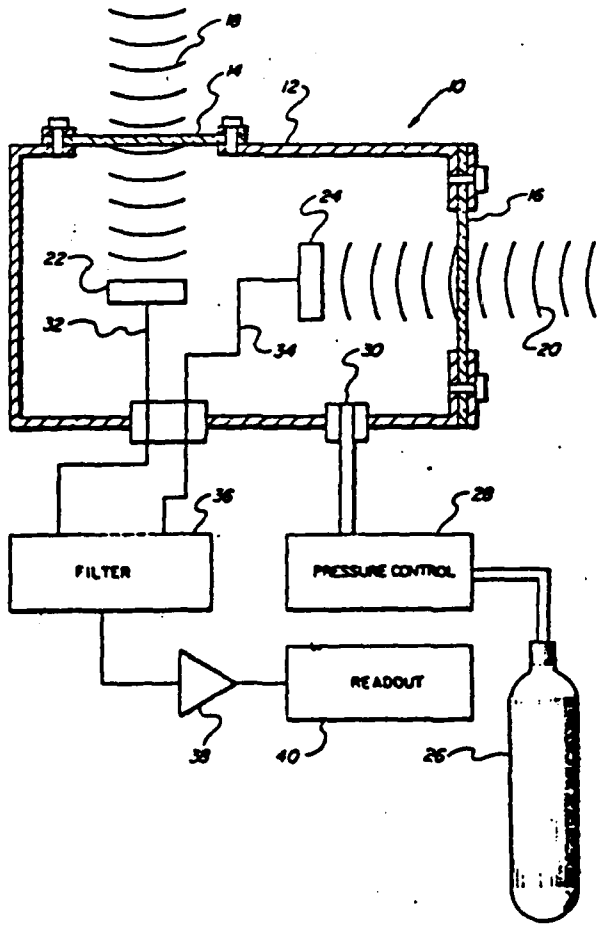
Primary Examiner—Richard A. Farley

Attorney, Agent, or Firm—H. Fredrick Hamann; Craig O. Malin; John J. Deinken

[57] **ABSTRACT**

Disclosed is an acoustic transducer which includes a pressure tight vessel with a window in the vessel which is transparent to acoustic wave energy. A gas is disposed within the vessel, while an electromechanical transducer is located within the vessel at an antinode for a resonant wave of the gas. A port communicates with the interior of the vessel, with a pressure control coupled to the port and to a source of the gas for controlling the pressure of the fluid within the vessel.

6 Claims, 3 Drawing Figures



United States Patent [19]

Takamura et al.

[11] **4,407,907**

[45] **Oct. 4, 1983**

[54] **AIR ELECTRODE**

[75] Inventors: **Tsutomu Takamura, Yokohama; Yuichi Sato, Atsugi; Toshiaki Nakamura, Yono; Nobukazu Suzuki, Tokyo, all of Japan**

[73] Assignee: **Tokyo Shibaura Denki Kabushiki Kaisha, Kawasaki, Japan**

[21] Appl. No.: **325,753**

[22] Filed: **Nov. 30, 1981**

[30] **Foreign Application Priority Data**

Dec. 23, 1980 [JP] Japan 55-181394

[51] Int. Cl.³ H01M 4/90; H01M 4/96

[52] U.S. Cl. 429/42; 429/43

[58] Field of Search 429/42, 43

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,276,909	10/1966	Moos	136/86
3,329,530	7/1967	Kometani et al.	429/42
3,410,727	11/1968	Jasinski	429/43
3,444,004	5/1969	Smith	429/42
3,591,421	7/1971	Schultze et al.	429/42
4,341,848	7/1982	Liu et al.	429/42

FOREIGN PATENT DOCUMENTS

2404312	5/1979	France	429/42

Primary Examiner—Donald L. Walton

Attorney, Agent, or Firm—Schwartz, Jeffery, Schwaab, Mack, Blumenthal & Koch

[57] **ABSTRACT**

An air electrode to be used for carrying out electrochemical reduction of an oxygen gas, which comprises an electrode body composed of a porous body and a fluorine-containing solvent incorporated therein. The air electrode is suitable for use in a hydrogen/oxygen fuel cell, a metal/air cell or an oxygen sensor.

18 Claims, No Drawings

United States Patent [19]

Gagnon

[11] **4,419,657**

[45] **Dec. 6, 1983**

[54] **SPEECH DIGITIZATION SYSTEM**

[75] Inventor: **Richard T. Gagnon**, Rochester, Mich.

[73] Assignee: **Federal Screw Works**, Detroit, Mich.

[21] Appl. No.: **338,521**

[22] Filed: **Jan. 17, 1982**

Related U.S. Application Data

[63] *Continuation of Ser. No. 880,996, Feb. 24, 1978, abandoned.*

[51] **Int. Cl.**[3] **H03K 13/05**

[52] **U.S. Cl.** ..... **340/347 R**; 340/347 AD; 340/347 DA; 375/30; 332/11 D

[58] **Field of Search** ..... 340/347 AD, 347 CC, 340/347 M, 146.3 AB; 375/27-30; 332/11 D

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,354,267	11/1967	Crater	370/109
3,544,779	12/1970	Farrow	235/311
3,603,970	9/1971	Bailey	340/347 AD
3,628,148	12/1971	Brolin	375/32
3,657,653	4/1972	Wilkinson	375/27
3,699,446	10/1972	Sainte-Beuve	375/27
3,806,806	4/1974	Brolin	375/30
3,872,434	3/1975	Duvall	340/146.3 AG
3,949,170	4/1976	Shionoya	340/347 AD
4,042,921	8/1977	Smith	375/30
4,099,122	7/1978	Van Buul	375/30

OTHER PUBLICATIONS

Electronics Weekly Article, Speech Signal Coding Handled by APCM, Jul. 25, 1973, pp. 18 and 19.

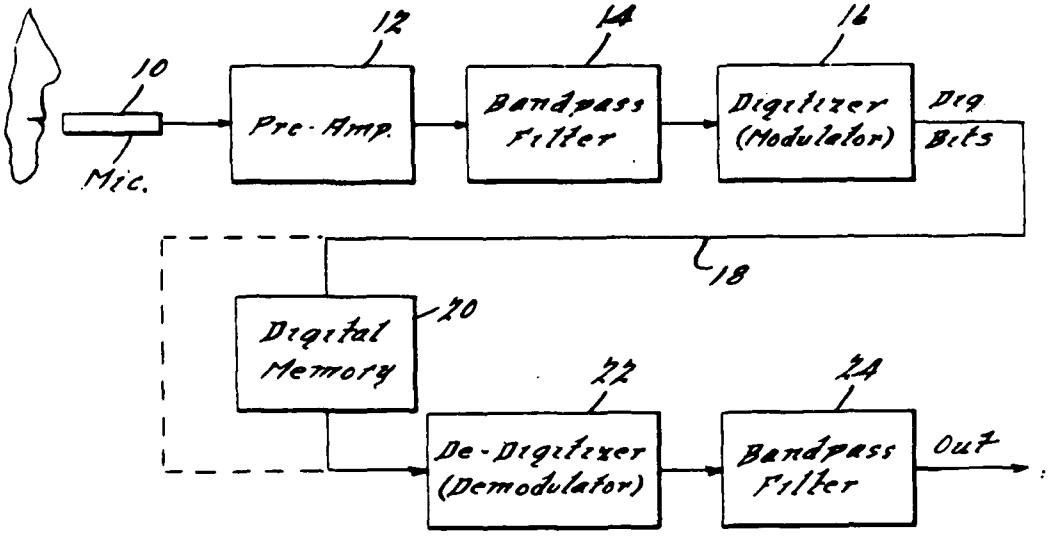
Primary Examiner—T. J. Sloyan

Attorney, Agent, or Firm—Harness, Dickey & Pierce

[57] **ABSTRACT**

A speech digitization system including novel encoder and decoder circuits that minimizes the number of resolution bits required to produce a given level of speech quality by optimizing the information content of the digital output signal from the encoder. This is accomplished by providing a companded speech digitization system that includes an amplitude function generator which is adapted to produce an amplitude function signal that maintains substantial duty cycles on the digital output signal over the entire audio amplitude range. Included in the novel amplitude function generator is a unique bias network that serves to center the duty cycle swing of the digital output signal from the encoder around 50% where the information content of the signal is statistically maximized.

13 Claims, 5 Drawing Figures



United States Patent [19]

McMahon

[11] **4,421,384**

[45] **Dec. 20, 1983**

[54] **FIBER OPTIC TRANSDUCER**

[75] Inventor: **Donald H. McMahon**, Carlisle, Mass.

[73] Assignee: **Sperry Corporation**, New York, N.Y.

[21] Appl. No.: **286,812**

[22] Filed: **Jul. 27, 1981**

Related U.S. Application Data

[63] Continuation of Ser. No. 63,504, Aug. 3, 1979, abandoned.

[51] **Int. Cl.**[3] **G02B 5/14**; G01D 5/34

[52] **U.S. Cl.** ..... **350/96.29**; 250/227; 250/231 P

[58] **Field of Search** ..... 350/96.29, 96.15, 96.16; 372/108; 250/231 P, 227; 73/655

[56] **References Cited**

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3,775,699	11/1973	Cassels	331/94.5
4,053,764	10/1977	Sierak	350/96.15

Primary Examiner—John K. Corbin

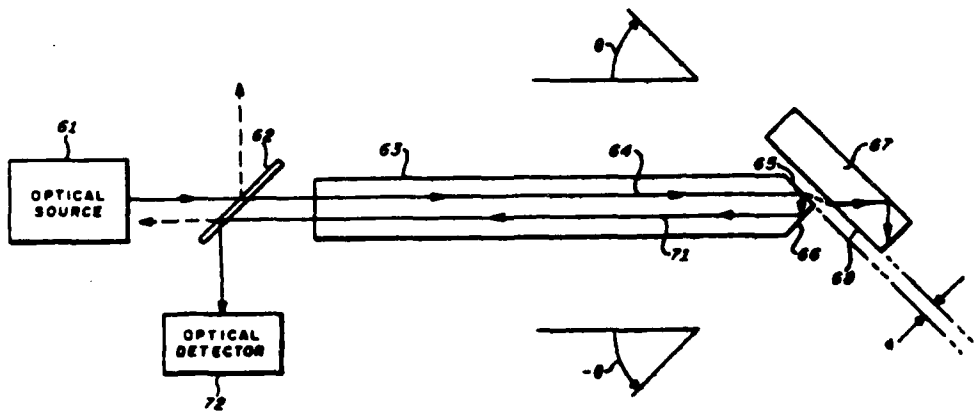
Assistant Examiner—Rodney B. Bovernick

Attorney, Agent, or Firm—Howard P. Terry; Seymour Levine

[57] **ABSTRACT**

A fiber optic transducer is provided by cutting and polishing the ends of two optical fibers, having equal indexes of refraction, at angles with respect to their axis such that all light signals propagating within the optical fibers are incident to the end face at angles that are greater than the critical angle defined for an interface between a medium with an index of refraction equal to the index of refraction equal to that of an intervening medium between the two fibers. The two end faces so cut are positioned to be in a parallel relationship, a distance apart that is less than the wavelength of the light propagating within the input fibers. Variations of this distance with the pressure changes caused by the acoustic environment produces variations in the optical signal energy coupled from the input optical fiber to the output optical fiber, thus creating an amplitude modulated light beam that propagates in the output optical fiber.

7 Claims, 4 Drawing Figures



United States Patent [19]

Groves et al.

[11] **4,423,494**

[45] **Dec. 27, 1983**

[54] **BEAM STEERABLE SONAR ARRAY**

[75] Inventors: **Kenneth W. Groves**, Forest Hills; **John D. Lea**, Huntington, both of N.Y.

[73] Assignee: **Sperry Corporation**, New York, N.Y.

[21] Appl. No.: **303,693**

[22] Filed: **Sep. 21, 1981**

[51] Int. Cl.³ G01S 3/80; G10K 11/34

[52] U.S. Cl. 367/123; 367/103

[58] Field of Search 367/103, 123

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,037,185 5/1962 Dewitz 367/103

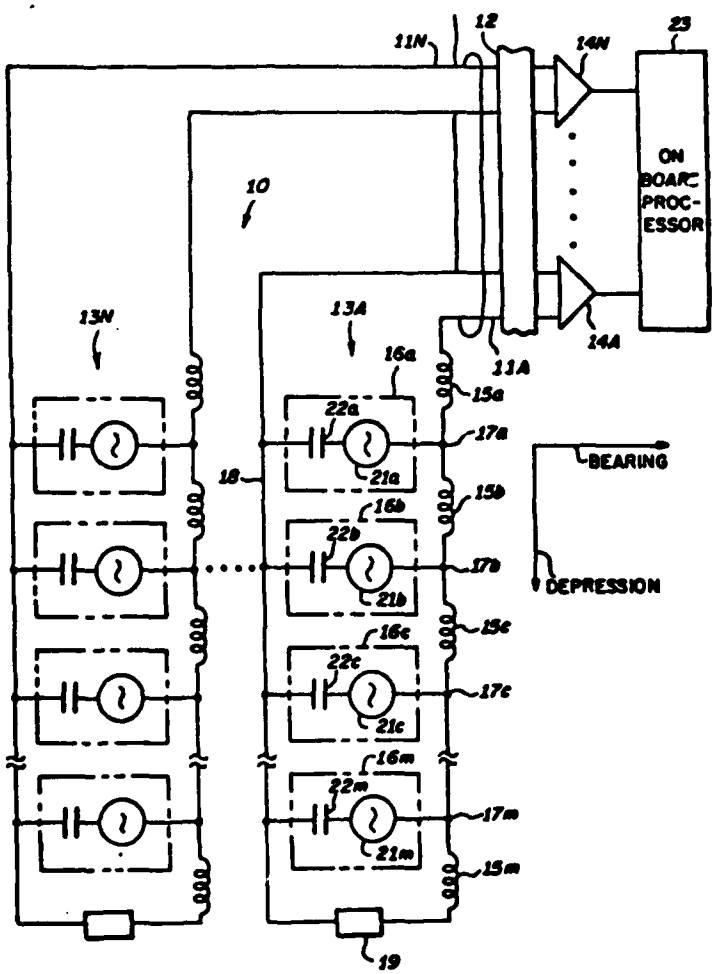
Primary Examiner—Richard A. Farley

Attorney, Agent, or Firm—Howard P. Terry; Seymour Levine

[57] **ABSTRACT**

A sonar array wherein the capacitance associated with the hydrophones of the array are utilized as shunt elements in an artificial transmission line in order to form an acoustic beam. Series inductance elements to the transmission line are variable with d.c. current flowing through coils wound about a magnetic core about which coils forming the series inductance of the line are also wound, thus permitting the sonar beam to be steered to any desired position.

9 Claims, 5 Drawing Figures



United States Patent [19]

Ouellette

[11] **4,423,660**

[45] **Jan. 3, 1984**

[54] **PARACHUTE RETAINER LATCHING MECHANISM**

[75] Inventor: **Charles W. Ouellette, Portsmouth, R.I.**

[73] Assignee: **Raytheon Company, Lexington, Mass.**

[21] Appl. No.: **289,938**

[22] Filed: **Aug. 4, 1981**

[51] Int. Cl.³ F41F 5/02

[52] U.S. Cl. ..... 89/1.5 R

[58] Field of Search ..... 102/387, 337-340, 102/348, 354; 89/1.5 R, 1.5 A, 1.5 D; 367/3, 4

[56] **References Cited**

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4,164,887	8/1979	Ouellette	89/1.5 R
4,209,151	6/1980	Saunders	102/387
4,263,835	4/1981	Dragonuk	89/1.5 R

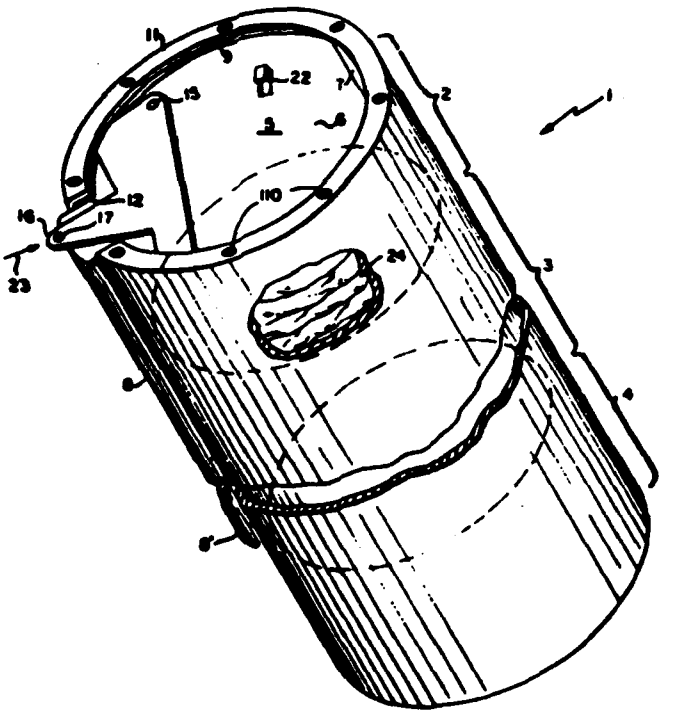
Primary Examiner—Charles T. Jordan

Attorney, Agent, or Firm—Martin M. Santa; Richard M. Sharkansky; Joseph D. Pannone

[57] **ABSTRACT**

A latching mechanism for retaining the cover of the compartment of a sonobuoy containing a parachute is described. The latching mechanism, when in a position which prevents the deployment of the parachute, extends beyond the periphery of the sonobuoy launching tube and thus prevents insertion of the sonobuoy into the launching tube. The latching mechanism must be moved to a position which releases the cover before it allows insertion of the sonobuoy into the launching tube thereby insuring deployment of the parachute after the sonobuoy has been ejected from the launching tube. The latching mechanism is a planar structure rotatably connected to the cover and rotates in a plane parallel to that of the plane of the cover. The resulting latching mechanism may be applied to sonobuoys without the necessity for modifying the launching tube structure used for prior art sonobuoys.

8 Claims, 5 Drawing Figures



United States Patent [19]

Gorski-Popiel

[11] **4,426,712**

[45] **Jan. 17, 1984**

[54] **CORRELATION SYSTEM FOR GLOBAL POSITION RECEIVER**

[75] Inventor: **George Gorski-Popiel**, Chelmsford, Mass.

[73] Assignee: **Massachusetts Institute of Technology**, Cambridge, Mass.

[21] Appl. No.: **266,679**

[22] Filed: **May 22, 1981**

[51] **Int. Cl.**[3] **H04K 1/04**

[52] **U.S. Cl.** **375/96**; 375/115; 370/107

[58] **Field of Search** 375/94, 96, 115; 370/18, 106, 107; 364/604, 728, 819

[56] **References Cited**

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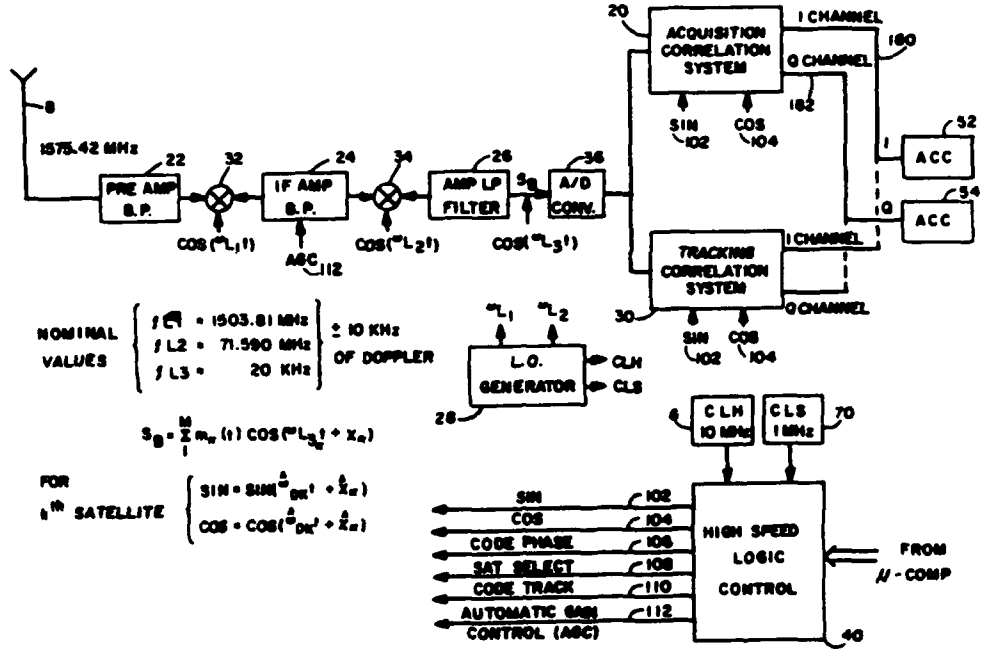
4,185,172	1/1980	Melindo et al.	375/96
4,209,834	6/1980	Rabow	375/96

Primary Examiner—Benedict V. Safourek
Assistant Examiner—Stephen Chin
Attorney, Agent, or Firm—Arthur A. Smith, Jr.; Thomas J. Engellenner

[57] **ABSTRACT**

A digital receiver for receiving and interpreting navigational data in the global position system comprising faster-than-real-time correlators for correlating the code portions of individual signals with matching codes stored in memory thus creating a plurality of virtual channels for acquiring and tracking each visible satellite.

7 Claims, 10 Drawing Figures



United States Patent [19]

Myer

[11] **4,449,210**

[45] **May 15, 1984**

[54] **FIBER OPTIC HYDROPHONE TRANSDUCERS**

[75] Inventor: **Jon H. Myer, Woodland Hills, Calif.**

[73] Assignee: **Hughes Aircraft Company, El Segundo, Calif.**

[21] Appl. No.: **332,791**

[22] Filed: **Dec. 21, 1981**

[51] **Int. Cl.**[3] **H04R 17/00**

[52] **U.S. Cl.** **367/149**; 367/140; 350/96.29; 350/96.21

[58] **Field of Search** ..... 367/140, 141, 149; 350/96.20, 96.21, 96.29; 248/20[illegible] A, 309 R; 308/10

[56] **References Cited**

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3,107,310	10/1963	Carriere et al.	308/10
3,152,716	10/1964	Feldhahn	52/DIG. 4
3,831,137	8/1974	Cuomo	367/141
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4,313,192	1/1982	Nelson et al.	367/79

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Fields et al., "Fiber Optic Pressure Sensor," *Journal of Acoustic Society of America*, vol. 67, No. 3, Mar. 1980, pp. 816–818.

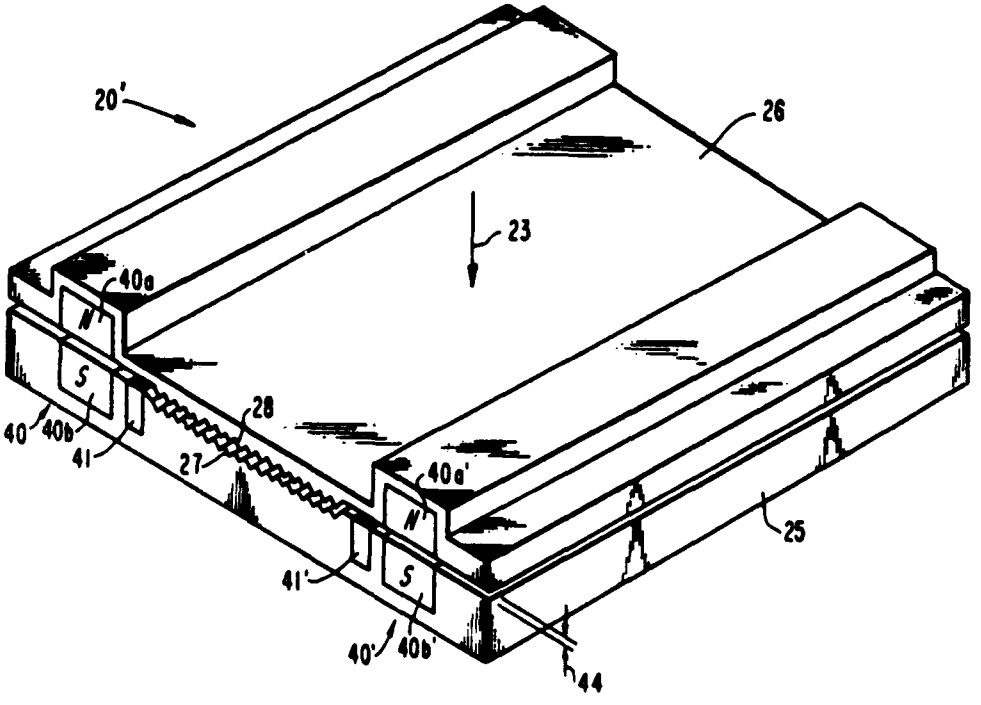
Jennhomme et al., "Directional Coupler for Multimode Optical Fibers", *Applied Physics Letters*, vol. 29, No. 8, Oct. 1976.

Primary Examiner—Harold J. Tudor
Assistant Examiner—Tyrone Davis
Attorney, Agent, or Firm—Russell Ben Miller; William J. Bethurum; Anthony W. Karambelas

[57] **ABSTRACT**

Apparatus is provided including a light source, a transducer and a detector, which is capable of detecting applied acoustic signals. The transducer employs first and second ridged members which have parallel rippled surfaces which contact opposite sides of a fiber optic waveguide. Each rippled surface has a different predetermined ripple pitch which provides for variable sensitivity along one dimension of the transducer. Modulation of the position of the ridged members relative to one another by means of applied acoustic signals causes microbend attenuation of light transmitted through the waveguide. The modulation of the light provides an indication of the presence of the acoustic signals. The variation in dimensional sensitivity provided by the transducer allows for a determination of the direction of arrival of the acoustic signals. Appropriate selection of pitch and pitch ratio of the two rippled surfaces provides any desired spatial sensitivity distribution of the hydrophone. A transducer is also disclosed which further incorporates magnetic elements to provide a mechanical prestress bias to the waveguide, thus providing a frictionless and hysteresis-free device.

12 Claims, 4 Drawing Figures



United States Patent [19]

Ouellette et al.

[11] **Patent Number: 4,464,130**

[45] **Date of Patent: Aug. 7, 1984**

[54] **MULTIPLE DEPTH SELECTOR MECHANISM**

[75] Inventors: **Charles W. Ouellette; David Edson, both of Portsmouth, R.I.**

[73] Assignee: **Raytheon Company, Lexington, Mass.**

[21] Appl. No.: **309,622**

[22] Filed: **Oct. 8, 1981**

[51] Int. Cl.³ B63B 21/52

[52] U.S. Cl. 441/25

[58] Field of Search ..... 441/7, 21, 24, 25, 26, 441/29; 242/54 R; 367/3

[56] **References Cited**

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3,991,475	11/1976	Segrest et al.	441/24

FOREIGN PATENT DOCUMENTS

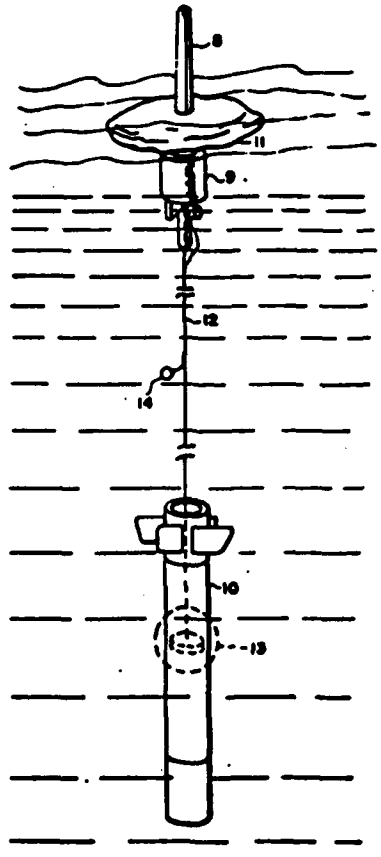
540558	8/1955	Belgium	441/24

Primary Examiner—Trygve M. Blix
Assistant Examiner—Jesús D. Sotelo
Attorney, Agent, or Firm—Martin M. Santa; Joseph D. Pannone; Richard M. Sharkansky

[57] **ABSTRACT**

A sonobuoy depth selector utilizes the tension in the attaching cable between the suspended sonobuoy and the supporting float to select the length of the attaching cable. Bobbins are attached to the cable at predetermined distances from the float. The bobbins are also mounted on a solenoid actuated pin which is tapered to cause only the bobbin resisting the tension in the cable to slide along the pin to a release position near the end of the pin. Momentary electrical energization of the solenoid causes the pin to release only the bobbin under cable tension thereby allowing the cable to pay out from a cable reel until stopped by the bobbin attached to the next larger predetermined length of cable.

9 Claims, 5 Drawing Figures



United States Patent [19]

Annis

[11] **Patent Number: 4,474,685**

[45] **Date of Patent: Oct. 2, 1984**

[54] **HIGH PERFORMANCE MOLDING COMPOUNDS FOR SHIELDING ELECTROMAGNETIC INTERFERENCE**

[75] Inventor: Myron C. Annis, North Tonawanda, N.Y.

[73] Assignee: Occidental Chemical Corporation, Niagara Falls, N.Y.

[21] Appl. No.: 363,322

[22] Filed: Mar. 29, 1982

[51] Int. Cl.³ H01B 1/02

[52] U.S. Cl. 252/503; 252/506; 252/511; 524/439; 524/440; 524/441; 524/495; 523/137; 523/451; 523/457; 523/458; 523/459; 523/468; 523/440; 523/512; 523/513; 264/104; 264/105

[58] Field of Search 252/502, 503, 506, 511; 524/439, 440, 441, 495, 496, 414; 264/104, 105; 523/137, 451, 457, 458, 459, 468, 440, 512, 513

[56] **References Cited**

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"Conductive Composites for EMI Shielding", Battelle Columbus Laboratories, 6-14-78.

Primary Examiner—Josephine L. Barr
Attorney, Agent, or Firm—James F. Tao; James F. Mudd

[57] **ABSTRACT**

High shielding efficiencies to emissions of electromagnetic interference are achieved with molding compositions comprised of thermosetting resins and a multicomponent electroconductive filler system. Compounds having a combination of at least two conductive fillers provide shielding efficiencies of 30 dB of attenuation or more to electromagnetic emissions over a frequency range of 0.5 to 1000 Mhz without adversely affecting mechanical properties and processing capabilities.

23 Claims, 3 Drawing Figures

United States Patent [19]

Berg

[11] **Patent Number: 4,482,937**

[45] **Date of Patent: Nov. 13, 1984**

[54] **BOARD TO BOARD INTERCONNECT STRUCTURE**

[75] Inventor: **William C. Berg, Stillwater, Minn.**

[73] Assignee: **Control Data Corporation, Minneapolis, Minn.**

[21] Appl. No.: **431,894**

[22] Filed: **Sep. 30, 1982**

[51] Int. Cl.³ H05K 1/14

[52] U.S. Cl. ..... 361/413; 339/17 LM; 339/176 MP; 361/414

[58] Field of Search ..... 361/413, 414, 415; 339/17 LM, 176 MP

[56] **References Cited**

U.S. PATENT DOCUMENTS

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3,836,935	9/1974	Johnson	339/17 LM
3,868,162	2/1975	Ammon	361/413 X
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4,232,923	11/1980	Otsuki et al.	339/17 M X
4,283,755	11/1981	Tracy	361/393

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Ho et al., Multiple LSI Silicon Chip Modules with Power Buses Composed of Laminated Silicon Sheets with Metallized Upper and Lower Surfaces, IBM Tech. Disc. Bull., V. 22, #8A, Jan. 1980, pp. 3410 and 3411.

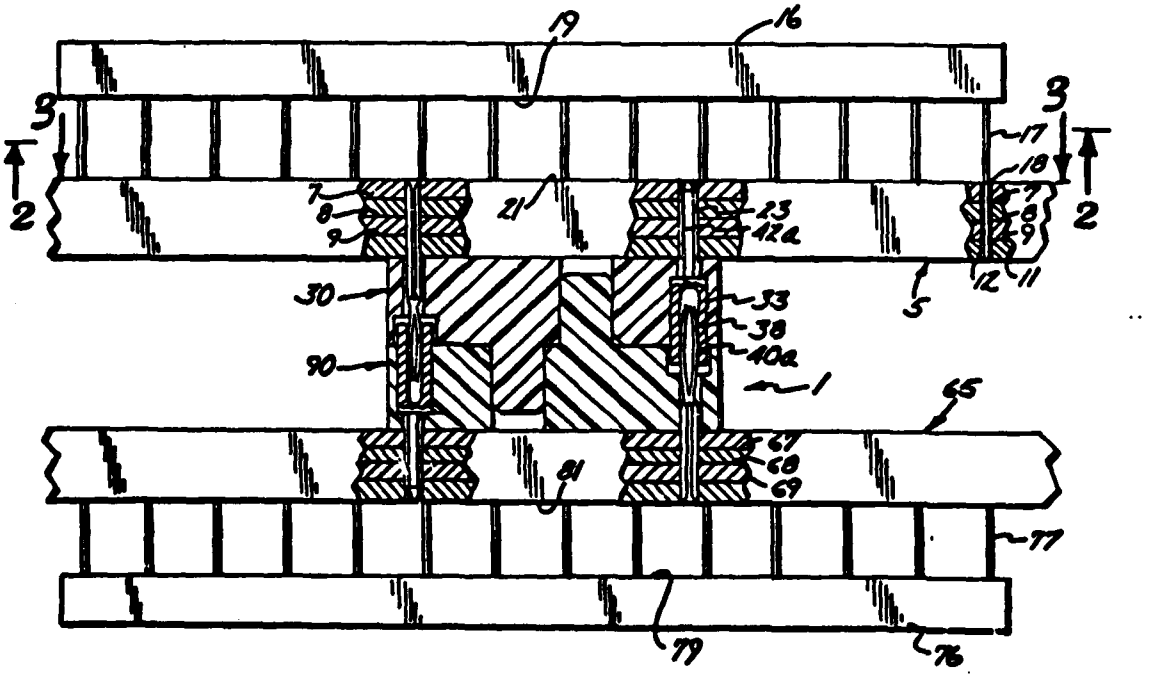
Primary Examiner—R. R. Kucia

Attorney, Agent, or Firm—Edmund J. Wasp; Joseph A. Genovese

[57] **ABSTRACT**

A board to board interconnect assembly is installed between a first multilayer circuit board and a second multilayer circuit board. The assembly is comprised of a first housing member carrying electrical contacts and a second housing member carrying electrical contacts which mateably engage with the contacts of the first housing member. The first and second circuit boards have corresponding arrays of plated through apertures selectively connected to the circuit layers of the respective boards. Socket carrying contacts are frictionally engaged in certain of the plated through conductive apertures of the first and second circuit boards to secure the first housing member to the first circuit board and the second housing member to the second circuit board. Flex contacts are installed in conductive plated through apertures of the boards opposite each of the socket contacts and are frictionally engaged with the socket contacts. The socket and flex contacts are frictionally coupled to electrically connect the circuit layers of the first circuit board with the circuit layers of the second circuit board in a direct vertical relationship. The opposed first and second housing members support and position the contacts and serve as spacers between the circuit boards.

2 Claims, 9 Drawing Figures



United States Patent [19]

van de Plassche et al.

[11] **Patent Number: 4,490,714**

[45] **Date of Patent: Dec. 25, 1984**

[54] **DIGITAL-TO-ANALOG CONVERTER FOR BIPOLAR SIGNALS**

[75] Inventors: **Rudy J. van de Plassche; Else C. Dijkmans, both of Eindhoven, Netherlands**

[73] Assignee: **U.S. Philips Corporation, New York, N.Y.**

[21] Appl. No.: **576,988**

[22] Filed: **Feb. 6, 1984**

Related U.S. Application Data

[63] Continuation of Ser. No. 313,445, Oct. 21, 1981, abandoned.

[30] **Foreign Application Priority Data**

May 7, 1981 [NL] Netherlands 8102226

[51] Int. Cl.³ H03K 13/02

[52] U.S. Cl. ..... 340/347 DA; 340/347 CC

[58] Field of Search ..... 340/347 DA, 347 DD, 340/347 CC

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,346,368 8/1982 Johnson ..... 340/347 DA

OTHER PUBLICATIONS

Siegel, "Understanding Digital Computers" ©1961, pp. 45–50.

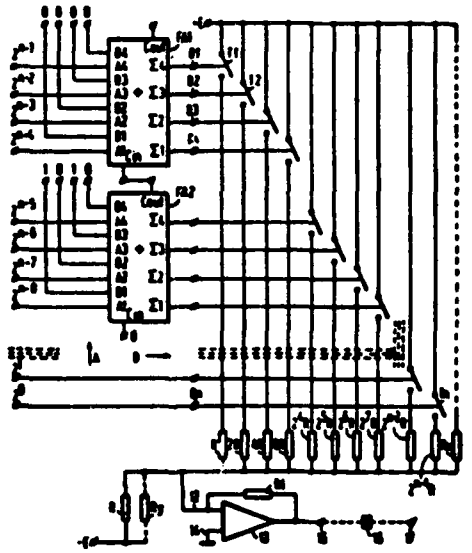
Primary Examiner—C. D. Miller

Attorney, Agent, or Firm—Thomas A. Briody; William J. Streeter

[57] **ABSTRACT**

In a digital-to-analog converter for bipolar signals all the bits change when the signals pass through the zero level. This results in a poor signal-to-noise ratio owing the small signal and the large noise contribution by the switching transients. The invention proposes to add a digital number to or subtract it from the digital input signal as an offset. As a result of this, the switching point is shifted towards a higher amplitude, which improves the signal-to-noise ratio and the distortion in the case of digital audio signals.

1 Claim, 3 Drawing Figures



United States Patent [19]

Nakamura et al.

[11] **Patent Number: 4,495,546**

[45] **Date of Patent: Jan. 22, 1985**

[54] **HYBRID INTEGRATED CIRCUIT COMPONENT AND PRINTED CIRCUIT BOARD MOUNTING SAID COMPONENT**

[75] Inventors: **Tsuneshi Nakamura, Hirakata; Tatsuro Kikuchi, Kyoto, both of Japan**

[73] Assignee: **Matsushita Electric Industrial Co., Ltd., Osaka, Japan**

[21] Appl. No.: **377,997**

[22] Filed: **May 13, 1982**

[30] **Foreign Application Priority Data**

May 18, 1981 [JP] Japan 56-74689

[51] Int. Cl.³ H05K 1/14; H05K 3/40

[52] U.S. Cl. 361/398; 29/837; 29/839; 361/412; 361/413; 361/388

[58] Field of Search 361/397, 398, 412, 413, 361/415, 388, 395; 29/830, 831, 835, 837, 838, 839, 845

[56] **References Cited**

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3,786,439	10/1973	Isaacson	361/389
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OTHER PUBLICATIONS

Jerry Lyman, Flexible Circuits Bend to Designers' Will, Electronics, Sep. 1977, pp. 97 to 105.

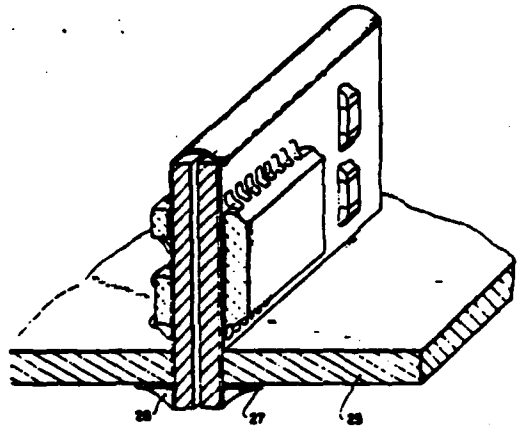
Primary Examiner—R. R. Kucia

Attorney, Agent, or Firm—Wenderoth, Lind & Ponack

[57] **ABSTRACT**

A hybrid integrated circuit component for insertion in a slit of a mother printed circuit board, and a method of mounting the hybrid integrated circuit component. The circuit component includes a flexible circuit board composed of a flexible insulated substrate, a circuit conductor formed on one side of the substrate, and a pair of conductor layers formed along opposite sides of the substrate to serve as external connection terminals. Circuit elements are mounted on the substrate and electrically connected to the circuit conductor. A pair of hard supporting plates are cemented on the other surface and at the opposite sides of the substrate so that the flexible circuit board can be folded at a center bending portion of the substrate so that the supporting plates face each other and so that the connection terminals are arranged close to each other when the substrate is folded and so that the substrate at its bending portion, when folded, has a sufficient spring characteristic for ensuring contact between the slit of the mother printed circuit board and each of the connection terminals, when the connection terminals are inserted into the slit of the mother printed circuit board.

24 Claims, 11 Drawing Figures



United States Patent [19]

Bakermans et al.

[11] **Patent Number: 4,513,353**

[45] **Date of Patent: Apr. 23, 1985**

[54] **CONNECTION OF LEADLESS INTEGRATED CIRCUIT PACKAGE TO A CIRCUIT BOARD**

[75] *Inventors:* **Johannes C. W. Bakermans, Harrisburg, Pa.; Dimitry G. Grabbe, Lisbon Falls, Me.; Iosif Korsunsky, Harrisburg, Pa.**

[73] **Assignee:** **AMP Incorporated, Harrisburg, Pa.**

[21] **Appl. No.:** **453,074**

[22] **Filed:** **Dec. 27, 1982**

[51] **Int. Cl.³** **H05K 1/18**

[52] **U.S. Cl.** ..... **361/399; 174/52 FP; 174/68.5; 339/17 CF; 361/403**

[58] **Field of Search** ..... **174/68.5, 52 FP; 361/403, 399; 339/17 CF**

[56] **References Cited**

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4,359,252	11/1982	Olsson et al.	339/17 CF
4,410,927	10/1983	Butt	361/403 X
4,417,778	11/1983	Halvorsen	339/75 MP X

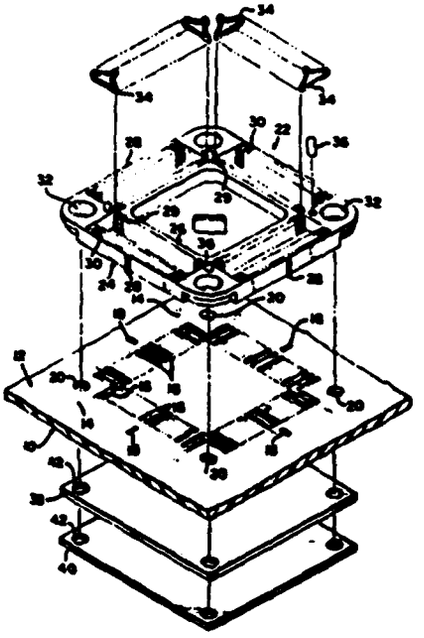
Primary Examiner—R. R. Kucia

Attorney, Agent, or Firm—Donald M. Boles

[57] **ABSTRACT**

A device for connecting leadless integrated circuit packages to a chip carrier housing or socket and then to a printed circuit board is taught. Briefly stated, a mask is selectively disposed on a printed circuit board. Locating ribs are correspondently disposed on a chip carrier housing so as to cooperatively engage the slots created by the absence of the mask on the printed circuit board. Additionally, barriers for separating contacts contained in the chip carrier housing are maintained at the interior and the exterior portion of the chip carrier housing walls with no material disposed therebetween thereby minimizing capacitive as well as inductive effects which may come about. Additionally, four discrete interlocking brackets are disposed on top of the chip carrier housing which allow for complete assembly of the chip carrier to the printed circuit board before mating of an integrated circuit chip with the retaining brackets then interlocked so as to relatively rigidly maintain a chip carrier in electrical contact with the contacts. The present device therefore allows for relatively fast accurate alignment of all attendant contact surfaces.

7 Claims, 5 Drawing Figures



United States Patent [19]
higaki et al.

[11] Patent Number: 4,531,095
[45] Date of Patent: Jul. 23, 1985

4] IMPULSE NOISE REDUCTION BY LINEAR INTERPOLATION HAVING IMMUNITY TO WHITE NOISE

5] Inventors: Yukinobu Ishigaki, Tokyo; Kazutoshi Hirohashi, Yokohama, both of Japan

3] Assignee: Victor Company of Japan, Limited, Japan

1] Appl. No.: 585,926

2] Filed: Mar. 2, 1984

0] Foreign Application Priority Data

Mar. 7, 1983 [JP] Japan 58-37130
Mar. 7, 1983 [JP] Japan 58-37131

51] Int. Cl.³ H03B 1/04
52] U.S. Cl. 328/165; 330/149; 455/223
58] Field of Search 330/149; 328/162-165; 455/303, 312, 223, 222; 375/104; 381/94

56] References Cited

U.S. PATENT DOCUMENTS

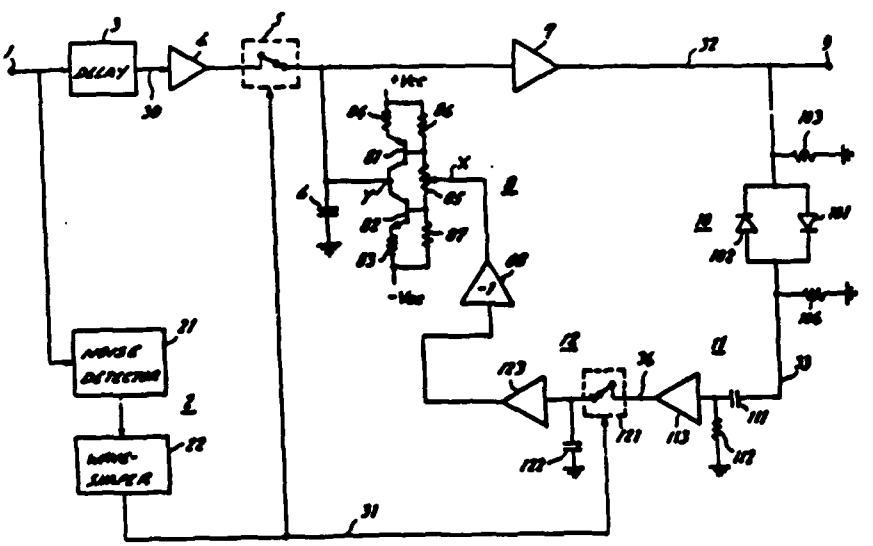
4,305,042 12/1981 Tanaka et al. ..... 328/165 X
4,311,963 1/1982 Watanabe et al. ..... 328/165 X

Primary Examiner—James B. Mullins
Attorney, Agent, or Firm—Lowe, King, Price & Becker

[57] ABSTRACT

An analog audio signal is applied to a sampling pulse generator (2) which generates a sampling pulse in response to an impulse noise introduced to the signal and also to a first sample-and-hold circuit (5, 6, 7) which tracks the waveform of the audio signal when impulse noise is nonexistent and holds the signal in the capacitor (6) in response to the sampling pulse. A nonlinear transfer circuit (10) is provided to eliminate white noise contained in the analog signal from the first sample-and-hold circuit and feeds its output to a differentiator (11) to derive a signal representative of the slope ratio of the analog signal. A second sample-and-hold circuit (12) samples the slope ratio signal in response to the sampling pulse and applies the sampled signal to a bidirectional constant current source (8) which provides constant current charging and discharging of the capacitor (6) to linearly vary the voltage sampled by the first sample-and-hold circuit (12).

6 Claims, 6 Drawing Figures



United States Patent [19]

Gudgeon

[11] **Patent Number: 4,536,955**

[45] **Date of Patent: Aug. 27, 1985**

[54] **DEVICES FOR AND METHODS OF MOUNTING INTEGRATED CIRCUIT PACKAGES ON A PRINTED CIRCUIT BOARD**

[75] Inventor: **Bryan Gudgeon, Rossendale, England**

[73] Assignee: **International Computers Limited, London, England**

[21] Appl. No.: **420,274**

[22] Filed: **Sep. 20, 1982**

[30] **Foreign Application Priority Data**

Oct. 2, 1981 [GB] United Kingdom 8129896

[51] Int. Cl.³ H05K 3/34; B23P 19/00

[52] U.S. Cl. ..... 29/840; 29/740; 339/17 CF

[58] Field of Search ..... 29/825, 739, 827, 740, 29/830, 729, 832, 840, 845, 846; 174/52 FP; 339/17 CF, 17 R; 357/74; 228/179

[56] **References Cited**

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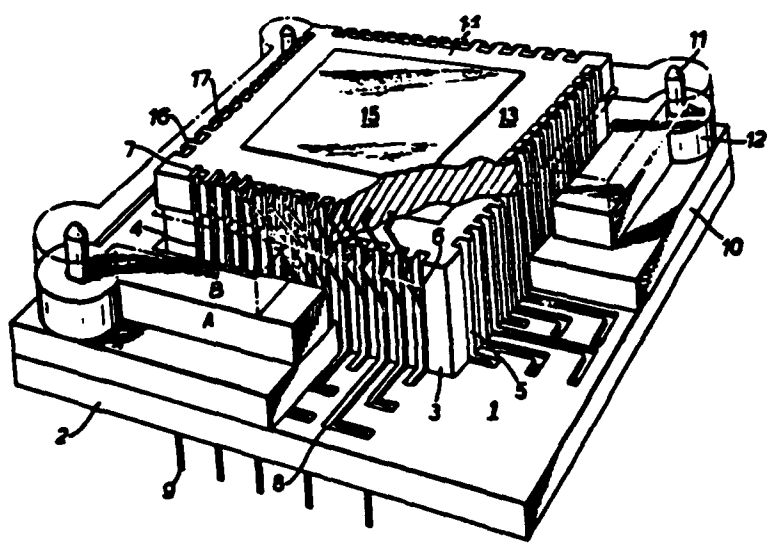
4,155,615	5/1979	Zimmerman, Jr. et al.	29/827 X
4,375,309	3/1983	Griffin	339/17 CF X

Primary Examiner—Mark Rosenbaum
Assistant Examiner—Carl J. Arbes
Attorney, Agent, or Firm—Lee, Smith & Zickert

[57] **ABSTRACT**

The device incorporates a support member (1) for the circuit package (13); a plurality of contact elements (4) for connection with the conductive terminations mounted on the support member each of the contact elements being resiliently biassed away from its associated conductive terminations (16) and means (12) for selectively exerting pressure upon the contact elements so as to urge them into contact with their associated conductive terminations to facilitate soldering and after such soldering to facilitate the removal of the circuit package (13) if and when desired, by allowing the pressure to be removed so that on de-soldering the resilient loading on a contact (4) will cause it automatically to spring away from the associated conductive terminations.

4 Claims, 7 Drawing Figures



United States Patent [19]

Bednarz et al.

[11] **Patent Number: 4,542,076**

[45] **Date of Patent: Sep. 17, 1985**

[54] **METALLIZED MOLDED PLASTIC COMPONENT HOUSINGS FOR SHIELDING AGAINST ELECTROMAGNETIC INTERFERENCE FIELDS**

[75] Inventors: **Jürgen Bednarz, Penzberg; Wolfgang Lindig, Munich, both of Fed. Rep. of Germany**

[73] Assignee: **Siemens Aktiengesellschaft, Berlin & Munich, Fed. Rep. of Germany**

[21] Appl. No.: **544,885**

[22] Filed: **Oct. 24, 1983**

[30] **Foreign Application Priority Data**

Dec. 27, 1982 [DE] Fed. Rep. of Germany 3248147

[51] Int. Cl.[4] C23F 1/00; B32B 15/08

[52] U.S. Cl. ..... 428/624; 428/625; 428/626; 428/161; 174/35 R; 315/85; 455/300

[58] Field of Search 428/161, 625, 626, 624

[56] **References Cited**

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3,898,369	8/1975	Clabburn	428/36
4,444,848	4/1984	Shanefield et al.	428/625

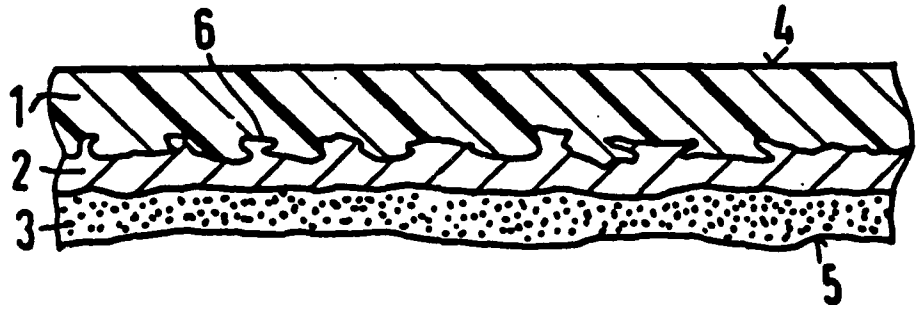
Primary Examiner—Veronica O'Keefe

Attorney, Agent, or Firm—Hill, Van Santen, Steadman & Simpson

[57] **ABSTRACT**

The invention relates to molded pieces of plastic having at least a partial metal coating of their surfaces. The surfaces to be coated are roughened up by means of suitable pretreatment so that a good adhesion of the metal coating on the molded pieces is provided. For the support of this metal coating additionally a cover layer is applied. The molded pieces can also consist of shrinkable material which e.g. are also designed in the form of enveloping objects such as cable fittings.

6 Claims, 1 Drawing Figure



United States Patent [19]

Liu

[11] **Patent Number: 4,542,653**

[45] **Date of Patent: Sep. 24, 1985**

[54] **APPARATUS AND METHOD FOR BEAMFORMING IN AN ULTRASONIC TRANSDUCER ARRAY**

[75] Inventor: **Ren-Young Liu, Mesa, Ariz.**

[73] Assignee: **Advanced Technology Laboratories, Inc., Bothell, Wash.**

[21] Appl. No.: **554,017**

[22] Filed: **Nov. 21, 1983**

[51] Int. Cl.[4] G01N 29/00

[52] U.S. Cl. 73/626; 128/660; 367/105; 367/905

[58] Field of Search 73/609, 617, 625, 626, 73/628; 128/660; 367/105, 905

[56] **References Cited**

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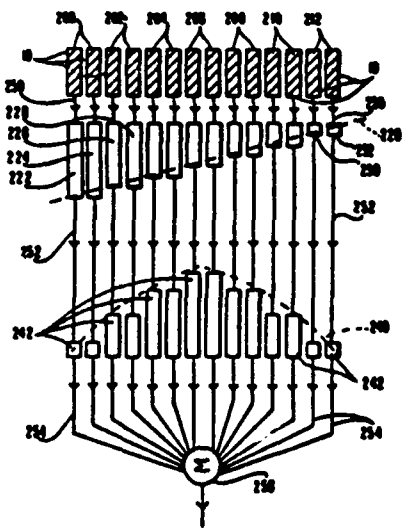
4,334,432	6/1982	Gill	73/625
4,458,533	7/1984	Borburgh	73/625

Primary Examiner—Stewart J. Levy
Assistant Examiner—John E. Chapman, Jr.
Attorney, Agent, or Firm—Lawrence S. Levinson; Robert E. Lee, Jr.

[57] **ABSTRACT**

Electronically changing the effective element spacing of an array of acoustic transducer elements between the transmit and receive modes of operation of an ultrasound apparatus results in reducing the deleterious effects of grating lobes present in the pattern of the array because of element spacings in excess of one half of a wavelength. A linear or quadratic time delay distribution, or both simultaneously, is applied to the array for scanning and/or focusing by setting individually the time delay of the energy associated with each element of the array during one mode of operation, e.g. transmit. The array is organized into groups of elements, e.g. pairs, and the time delay distribution is applied by setting the time delay of the energy associated with each group of the array during the remaining mode of operation, e.g. receive.

6 Claims, 6 Drawing Figures



United States Patent [19]

Shaw et al.

[11] Patent Number: 4,554,510

[45] Date of Patent: Nov. 19, 1985

[54] **SWITCHING FIBER OPTIC AMPLIFIER**

[75] Inventors: Herbert J. Shaw, Stanford; Michel J. F. Digonnet, Palo Alto, both of Calif.

[73] Assignee: The Board of Trustees of Leland Stanford Junior University, Stanford, Calif.

[21] Appl. No.: 531,231

[22] Filed: Sep. 12, 1983

[51] Int. Cl.[4] H01S 3/094; H03F 3/68

[52] U.S. Cl. 330/4.3; 330/4; 330/84; 330/85; 330/122; 372/6; 372/71

[58] Field of Search 330/4.3, 4, 84, 5, 122, 330/147.8; 372/6, 71; 455/607; 350/96.15; 332/7.51

[56] References Cited

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Bergh et al., Electronic Letters, vol. 16, No. 7, Mar. 27, 1980, "Single Mode Fiber Optic Directional Coupler", pp. 260-261.

List continued on next page.

Primary Examiner—S. C. Buczinski

Assistant Examiner—Burton J. Carniol

Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear

[57] ABSTRACT

A fiber optic amplifier utilizes a crystal fiber of laser material to bidirectionally amplify light signals. This amplifier permits the application of both pumping illumination and the signal to be amplified to the end of the crystal fiber to avoid the disadvantages inherent in side pumping this fiber. End pumping is accomplished by taking advantage of the slow spontaneous fluorescence of the laser crystal to sequentially apply the pumping illumination and then the signal to be amplified to the crystal. This sequential application of signals is made possible through the use of a switchable coupler which allows light to be selectively coupled from either of a pair of input optical fibers to a single output optical fiber which is coupled to the crystal fiber. The pumping illumination is initially supplied to the crystal fiber to invert the ions within the crystal. Once these ions are inverted, the coupler is switched to permit the application of the signal to be amplified to the crystal, and the application of pumping illumination is temporarily discontinued. The signal to be amplified propagates through the crystal to stimulate emission of coherent light from the laser material resulting in amplification of the signal. When this amplification process is complete, pumping illumination is again applied through the switch to the crystal fiber.

18 Claims, 11 Drawing Figures

United States Patent [19]

Toone et al.

[11] **Patent Number: 4,590,590**

[45] **Date of Patent: May 20, 1986**

[54] **SONOBUOY MULTIPLE DEPTH DEPLOYMENT APPARATUS**

[75] Inventors: **James R. Toone**, Fort Wayne; **Robert L. Barker**, Ossian, both of Ind.

[73] Assignee: **Magnavox Government and Industrial Electronics Company**, Fort Wayne, Ind.

[21] Appl. No.: **555,979**

[22] Filed: **Nov. 29, 1983**

[51] Int. Cl.[4] **B63B 21/52**

[52] U.S. Cl. **367/4**; 441/25; 441/33

[58] Field of Search 367/4; 441/7, 24, 25, 441/33

[56] **References Cited**

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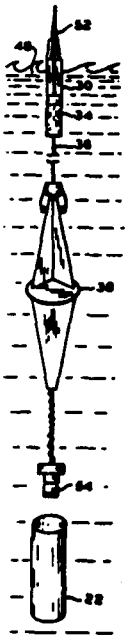
4,464,130	8/1984	Ouellette et al.	367/4 X

Primary Examiner—Richard A. Farley
Attorney, Agent, or Firm—Thomas A. Briody; William J. Streeter; Richard T. Seeger

[57] **ABSTRACT**

A sonobuoy float canister is releasably latched to a wound cable pack container. The cable is attached at its upper end to the canister and at its lower end to a lower sonobuoy component. A rotor latches the canister and container together in one rotative position so that the cable is not unwound or payed out to provide a first or shallow depth deployment of the lower component. In a second rotative position of the rotor the canister and container are unlatched from one another and the cable is positively restrained after a predetermined partial payout to provide a medium depth deployment of the lower component. In a third rotative position of the rotor the positive restraint of cable payout is removed and the canister and container are unlatched so that the cable is fully payed out to provide for full depth deployment of the underwater component.

11 Claims, 20 Drawing Figures



United States Patent [19]

Asazawa

[11] **Patent Number: 4,591,802**

[45] **Date of Patent: May 27, 1986**

[54] **FEEDBACK AMPLIFIER CIRCUIT INCLUDING CASCADE CONNECTED FIELD EFFECT TRANSISTORS**

[75] Inventor: **Hiroshi Asazawa**, Tokyo, Japan

[73] Assignee: **NEC Corporation**, Tokyo, Japan

[21] Appl. No.: **730,335**

[22] Filed: **May 3, 1985**

[30] **Foreign Application Priority Data**

May 8, 1984 [JP] Japan 59-90225

[51] **Int. Cl.**[4] **H03F 3/16**

[52] **U.S. Cl.** **330/277**; 330/302; 330/293

[58] **Field of Search** 330/277, 290, 291, 293, 330/294, 302, 310, 311

[56] **References Cited**

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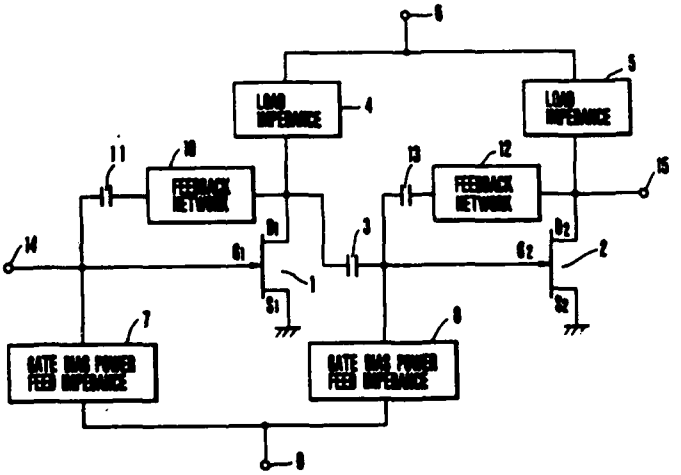
Primary Examiner—James B. Mullins
Assistant Examiner—Steven J. Mottola
Attorney, Agent, or Firm—Laff, Whitesel, Conte & Saret

[57] **ABSTRACT**

A multistage type amplifier circuit comprises a plurality of FETs cascade-connected to each other through interstage capacitors. The first amplifier stage of an FET is additionally provided with a feedback circuit coupled between respective gates of the first-stage FET and the next stage FET. The next amplifier stage of an FET is also provided with a similar feedback circuit coupled between respective drains of the first and next stage FETs successively connected. Thus, this makes it possible to reduce the required number of dc block capacitors to less than one-half, resulting in a small area occupation of capacitors when IC is realized. Further, the amplifier circuit is configured so that each amplifier stage is not provided with a dc block capacitor in the negative feedback circuit, leading to a significant improvement in frequency characteristics of the amplifier circuit in a low frequency range.

16 Claims, 2 Drawing Figures



United States Patent [19]

Yoshida

[11] **Patent Number: 4,600,915**

[45] **Date of Patent: Jul. 15, 1986**

[54] **DIGITAL-TO-ANALOG CONVERTER CIRCUIT**

[75] Inventor: Masayuki Yoshida, Saitama, Japan

[73] Assignee: Pioneer Electronic Corporation, Tokyo, Japan

[21] Appl. No.: 708,904

[22] Filed: Mar. 6, 1985

[30] Foreign Application Priority Data

Mar. 7, 1984 [JP] Japan ..... 59-33421[U]

[51] Int. Cl.[4] H03M 1/66

[52] U.S. Cl. ..... 340/347 DA; 340/347 SH

[58] Field of Search ..... 340/347 DA, 347 AD, 340/347 CC, 347 SH; 364/726, 724, 572

[56] References Cited

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4,306,222 12/1981 Peek ..... 340/347 DA

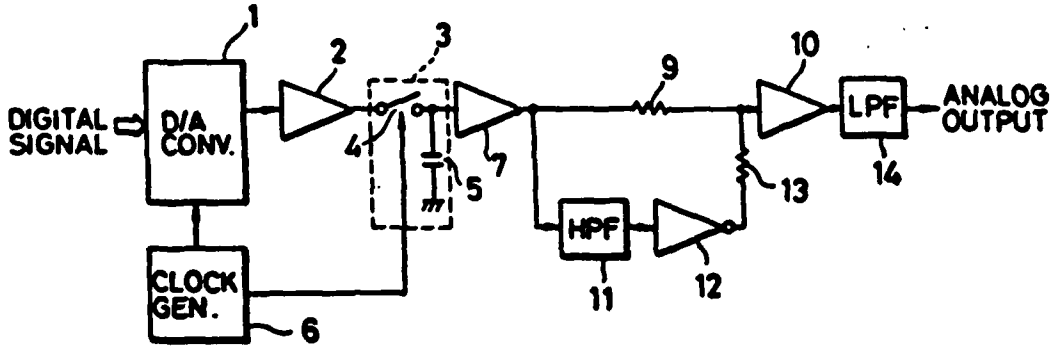
Primary Examiner—Charles D. Miller

Attorney, Agent, or Firm—Sughrue, Mion, Zinn, Macpeak & Seas

[57] **ABSTRACT**

A digital-to-analog converter circuit for converting digitized audio signals to analog form having improved phase characteristics and a reduced noise level while employing a less costly low-pass filter than conventional circuits. A digital-to-analog converter converts an analog signal, which has frequency components within a range lower than a first frequency, to analog form. A sample-and-hold circuit samples and holds the output of the digital-to-analog converter at a second frequency more than twice as high as the first frequency. Frequency components in the output of the sample-and-hold circuit above a third frequency between the first and second frequencies are phase inverted. The output of the sample-and-hold circuit and the output of the inverting circuit are summed and applied to a low-pass filter, the output of which provides the analog output from the circuit.

3 Claims, 10 Drawing Figures



United States Patent [19]

Tompsett et al.

[11] **Patent Number: 4,634,997**

[45] **Date of Patent: Jan. 6, 1987**

[54] **AUTOMATIC GAIN CONTROL AMPLIFIER CIRCUIT**

[75] **Inventors:** Michael F. Tompsett, Summit; Edward J. Zimany, Jr., Morristown, both of N.J.

[73] **Assignee:** AT&T Bell Laboratories, Murray Hill, N.J.

[21] **Appl. No.:** 670,819

[22] **Filed:** Nov. 13, 1984

[51] **Int. Cl.**[4] H03G 3/30

[52] **U.S. Cl.** 330/284; 330/280; 330/279; 330/129

[58] **Field of Search** ..... 330/51, 86, 129, 279, 330/280, 281, 284; 333/81 R; 340/347 DA

[56] **References Cited**

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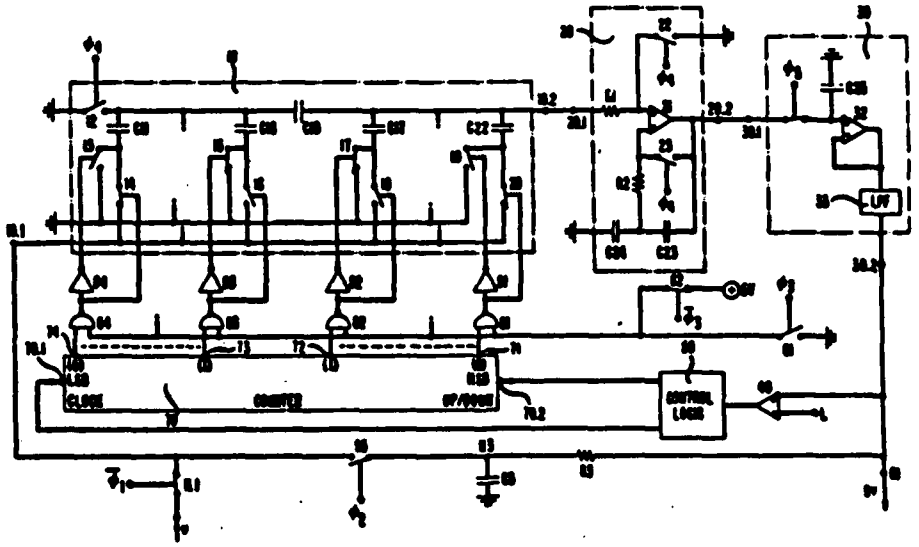
J. H. Davis, "Bi-FET Op Amps Simplify AGC Threshold Design," *Electronics*, Apr. 21, 1981, pp. 184-185.

Primary Examiner—Eugene R. LaRoche
Assistant Examiner—Steven J. Mottola
Attorney, Agent, or Firm—David I. Caplan

[57] **ABSTRACT**

An automatic gain control (AGC) amplifier circuit uses a control loop comprising a digital counter (70) which controls a multiplying digital-to-analog converter (10) arranged as an attenuator of the input v to the AGC. The counter (70) is arranged to count up or down depending upon the output signal of the AGC circuit. In addition, a latency can be introduced into the control loop so that in case of most signal envelope variations, the counter is frozen to prevent output fluctuations.

4 Claims, 6 Drawing Figures



United States Patent [19]

Vitriol et al.

[11] **Patent Number: 4,645,552**

[45] **Date of Patent: Feb. 24, 1987**

[54] **PROCESS FOR FABRICATING DIMENSIONALLY STABLE INTERCONNECT BOARDS**

[75] Inventors: **William A. Vitriol, Anaheim; Raymond L. Brown, Riverside, both of Calif.**

[73] Assignee: **Hughes Aircraft Company, Los Angeles, Calif.**

[21] Appl. No.: **672,562**

[22] Filed: **Nov. 19, 1984**

[51] Int. Cl.[4] B32B 31/26

[52] U.S. Cl. 156/89; 29/829; 29/846; 29/851; 29/852

[58] Field of Search 156/89; 29/829, 831, 29/832, 837, 846, 851, 852

[56] **References Cited**

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0062763	9/1982	European Pat. Off. .	
0098067	1/1984	European Pat. Off. .	
2301277	8/1973	Fed. Rep. of Germany	29/851

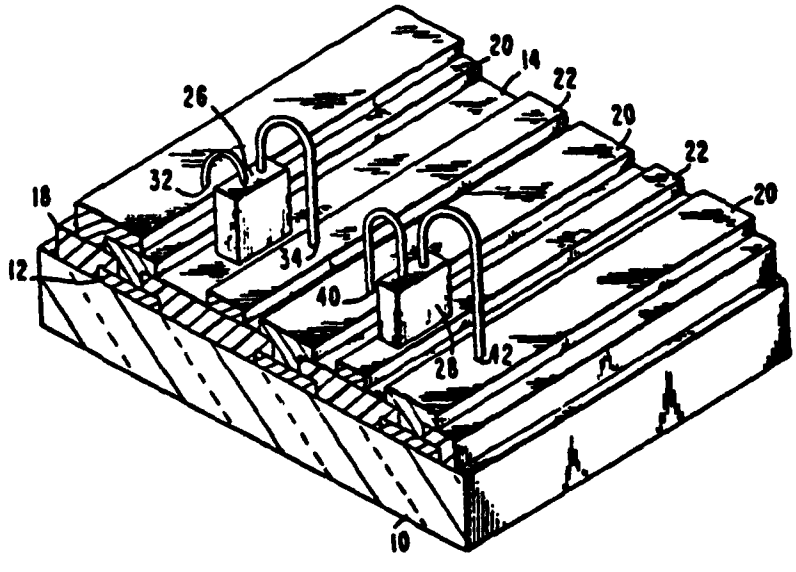
Primary Examiner—Caleb Weston

Attorney, Agent, or Firm—K. W. Float; A. W. Karambelas

[57] **ABSTRACT**

We disclose a process for manufacturing multilayer circuit boards which includes providing a conductive, or an insulating substrate with a conductive pattern thereon, and then transferring and firing a glass-ceramic tape layer to the surface of the substrate. This tape layer provides both electrical isolation between the substrate and electrical conductors or electronic components which are subsequently bonded to or mounted on the top surface of the glass-ceramic tape layer. By providing vertical electrical conductors by means of vias in the tape layer prior to firing the tape layer directly on the substrate, good X and Y lateral dimensionally stability of the tape material is maintained. In addition, a high quality thick film glass-ceramic electrical interconnect structure is achieved at a relatively low manufacturing cost.

25 Claims, 6 Drawing Figures



United States Patent [19]

Lillis et al.

[11] **Patent Number: 4,651,132**

[45] **Date of Patent: * Mar. 17, 1987**

[54] **ANALOG TO DIGITAL CONVERTER SYSTEM FOR APPLICATION TO PULSE CODE MODULATION**

[75] Inventors: **William J. Lillis; Jimmy R. Naylor, both of Tucson, Ariz.**

[73] Assignee: **Burr-Brown Corporation, Tucson, Ariz.**

[*] Notice: **The portion of the term of this patent subsequent to Jan. 28, 2003 has been disclaimed.**

[21] Appl. No.: **736,400**

[22] Filed: **May 20, 1985**

Related U.S. Application Data

[63] **Continuation of Ser. No. 351,500, Feb. 23, 1982, abandoned.**

[51] **Int. Cl.[4] H03M 1/38**

[52] **U.S. Cl. ..... 340/347 AD; 340/347 DA; 340/347 CC; 340/347 M**

[58] **Field of Search ... 340/347 M, 347 AD, 347 DA, 340/347 CC**

[56] **References Cited**

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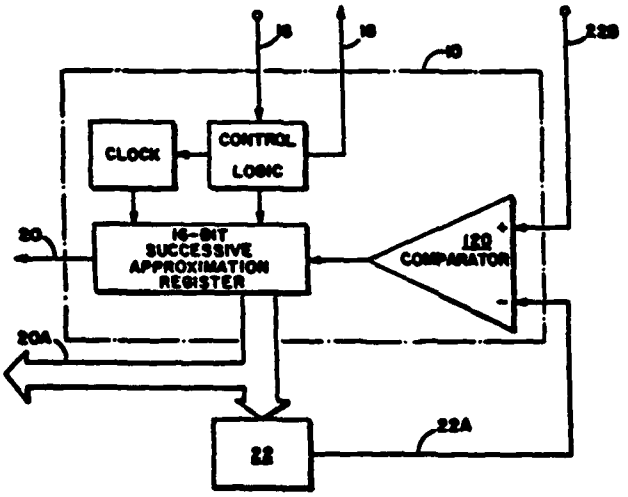
Primary Examiner—T. J. Sloyan

Attorney, Agent, or Firm—Harry M. Weiss & Associates

[57] **ABSTRACT**

A digital audio system for high-fidelity replication of wideband audio material. The system comprises a high-speed, low-noise and low-distortion, digital-to-analog converter including means for reducing spurious switching currents in the reconstructed audio signal. Such a converter is employed in both the encoding and decoding portions of the system.

1 Claim, 7 Drawing Figures



United States Patent [19]

Barker

[11] **Patent Number: 4,654,832**

[45] **Date of Patent: Mar. 31, 1987**

[54] **SONOBUOY RETAINING AND RELEASE APPARATUS**

[75] Inventor: Robert L. Barker, Ossian, Ind.

[73] Assignee: Magnavox Government and Industrial Electronics Company, Fort Wayne, Ind.

[21] Appl. No.: 555,978

[22] Filed: Nov. 29, 1983

[51] Int. Cl.[4] B63B 21/52

[52] U.S. Cl. 367/4; 441/33

[58] Field of Search 367/4; 441/7, 24, 25, 441/33; 294/82.25

[56] References Cited

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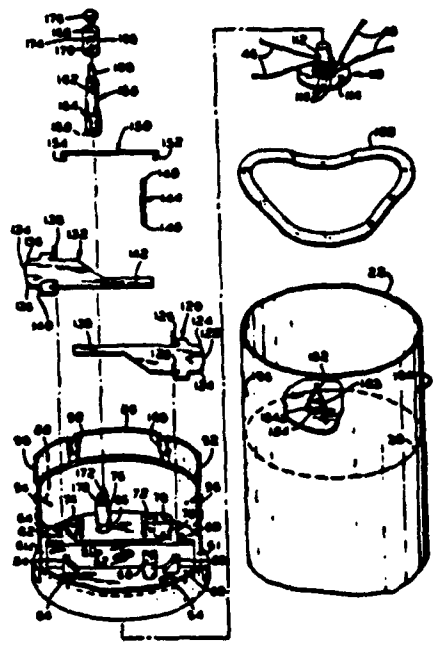
Primary Examiner—Richard A. Farley

Attorney, Agent, or Firm—Thomas A. Briody; William J. Streeter; Richard T. Seeger

[57] ABSTRACT

Sonobuoy parachute shroud line ends are retained by a cup mounted in and adjacent one end of the sonobuoy outer casing. A heavy ejection spring is beneath the cup for forcibly ejecting the cup outwardly from the one end of the casing. The cup is retained in the casing against the spring force by a pair of partially overlapping elongated plates each having one end releasably inserted in a circumferential slot in the outer casing. The slots being adjacent the casing one end and diametrically opposed. The upper plate is in retentive contact near the other of its ends by a first retainer rod pivoted at one of its ends to the cup bottom surface. The first rod contacts the upper plate near the pivoted rod end and is in retentive contact near its other end with a second retainer rod pivoted at one of its ends to the cup bottom surface. The second rod contacts near its pivoted end the first rod and is in retentive contact at its other end with a one shot spring motor driven pin. The location of the points of contact between the plates, the upper plate and the first rod, the first and second rods and the pin and the second rod provide lever arms that result in a very high mechanical advantage between the retaining force of the pin on the second rod and the ejection spring force. Upon ejection, the cup, parachute, and shroud lines are ejected and other sonobuoy components are released from the outer casing.

10 Claims, 14 Drawing Figures



United States Patent [19]

Jones et al.

[11] **Patent Number: 4,661,938**

[45] **Date of Patent: Apr. 28, 1987**

[54] **SONAR APPARATUS**

[75] Inventors: **Charles H. Jones**, Pasadena; **John W. Kesner**, Severna Park, both of Md.

[73] Assignee: **Westinghouse Electric Corp.**, Pittsburgh, Pa.

[21] Appl. No.: **821,717**

[22] Filed: **Jan. 23, 1986**

[51] **Int. Cl.**[4] **G01S 3/80**

[52] **U.S. Cl.** **367/123**; 367/153

[58] **Field of Search** 367/123, 129, 153, 155, 367/156

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,803,543 4/1974 Cioccio et al. 367/123

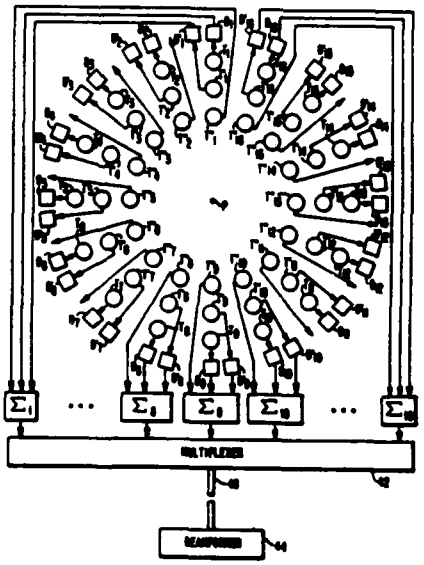
Primary Examiner—Richard A. Farley

Attorney, Agent, or Firm—D. Schron

[57] **ABSTRACT**

A passive sonar system which forms multiple receiver beams for detection of possible targets. The transducer array for the system includes a plurality of pairs of transducers, the transducers of each pair lying along a generally radial line emanating from a central point. The output signal from the outer transducer of each pair is delayed by 90° or $\lambda/4C$ relative to the inner transducer, and the delayed signal is combined with the output signal from the other transducer of the pair in a summing amplifier so that only one signal per transducer pair need be sampled by a multiplexer for transmission via a coaxial cable to beamformer apparatus. The concept is applicable to groups of transducers with more than just a pair, i.e., with three or more transducers. Appropriate additional delays are provided with all of the output signals and delayed output signals of a group being received by a single summing amplifier.

11 Claims, 13 Drawing Figures



United States Patent [19]

Hudson et al.

[11] **Patent Number: 4,673,363**

[45] **Date of Patent: Jun. 16, 1987**

[54] **MARINE MEASUREMENT DEVICE**

[75] Inventors: **Alan T. Hudson**, Mattapoisett; **David P. Gagnon**, East Sandwich; **David W. Johns, II**, Marion; **William J. Langenbein, Jr.**, S. Dennis, all of Mass.

[73] Assignee: **Sippican Ocean Systems, Inc.**, Marion, Mass.

[21] Appl. No.: **797,175**

[22] Filed: **Nov. 8, 1985**

Related U.S. Application Data

[63] Continuation of Ser. No. 504,571, Jun. 15, 1983, abandoned.

[51] **Int. Cl.**[4] **B63B 22/00**; B63B 22/20; B63B 22/26

[52] **U.S. Cl.** **441/1**; 264/516; 361/399; 441/22; 441/23; 441/33

[58] **Field of Search** 441/1, 11, 22, 23, 32, 441/33; 361/395, 399; 367/3, 4; 264/516, 523, 540

[56] **References Cited**

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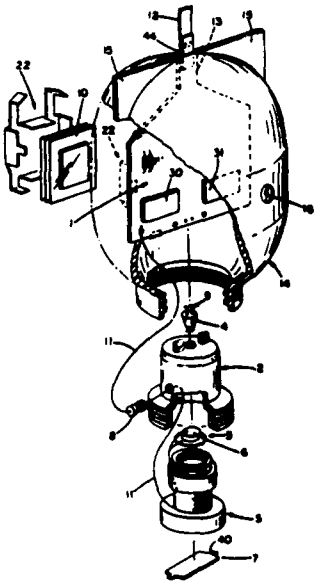
Primary Examiner—Sherman D. Basinger

[57] **ABSTRACT**

A sonobuoy having a terminal weight and sensor for deployment beneath the surface of the water after the buoy has been launched from an aircraft and impacted the water. A circuit assembly and antenna for processing output from the sensor and for transmitting a signal is provided. A cable for connecting the sensor and circuit assembly is also included. A housing for the sonobuoy is a blow molded seamless thermoplastic shell which surrounds the circuit assembly.

29 Claims, 12 Drawing Figures



United States Patent [19]

Congdon et al.

[11] **Patent Number: 4,689,773**

[45] **Date of Patent: Aug. 25, 1987**

[54] **EXTENDIBLE SONOBUOY APPARATUS**

[75] Inventors: **John C. Congdon; Thomas A. Richter; Joseph J. Slachta,** all of Fort Wayne, Ind.

[73] Assignee: **Magnavox Government and Industrial Electronics Company,** Fort Wayne, Ind.

[21] Appl. No.: **748,751**

[22] Filed: **Jun. 26, 1985**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 446,330, Dec. 2, 1982, Pat. No. 4,546,459.

[51] **Int. Cl.**[4] **H04B 1/59**

[52] **U.S. Cl.** **367/3**; 367/159; 367/165; 367/169; 367/173

[58] **Field of Search** 367/2-6, 367/151, 152, 153, 154, 155, 157, 159, 164, 165, 166, 169-171, 173, 178, 141

[56] **References Cited**

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4,546,459	10/1985	Congdon	367/159 X

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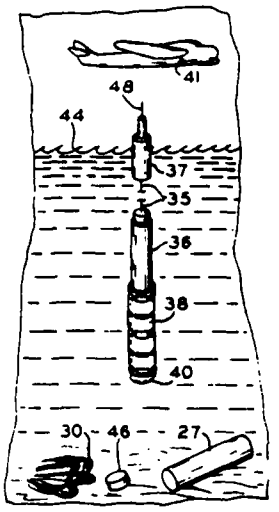
2132128	1/1972	Fed. Rep. of Germany	367/4

Primary Examiner—Deborah L. Kyle
Assistant Examiner—John E. Griffiths
Attorney, Agent, or Firm—Thomas A. Briody; William J. Streeter; Richard T. Seeger

[57] **ABSTRACT**

A sonobuoy has several components slidably mounted in an elongated tube. The components are longitudinally stacked one above the other at the lower end of the tube when the sonobuoy is in a pre-deployed state and are caused to slide longitudinally upwardly in the tube during sonobuoy deployment to provide a predetermined longitudinal spacing between the components when the sonobuoy is deployed. The components typically include an electronics canister, acoustic wave phase controls and one or more active electroacoustic transducers. The components are attached to a plurality of flexible support cables. The cables are attached at their respective upper ends to the bottom of the canister and are attached at their lower ends to the bottom of the tube. The cables are collapsed during the pre-deployed state and tautly extended during the deployed state. Axial guide strips are affixed to the inner surface of the tube. The canister and transducer have recesses engaging the strips in a sliding fit to prevent rotation about the tube longitudinal axis during deployment. The electroacoustic transducer may be mounted to the tube at a predetermined axial location on the tube.

10 Claims, 30 Drawing Figures



United States Patent [19]

Grabbe et al.

[11] **Patent Number: 4,699,593**

[45] **Date of Patent: Oct. 13, 1987**

[54] **CONNECTOR HAVING CONTACT MODULES FOR A SUBSTRATE SUCH AS AN IC CHIP CARRIER**

[75] Inventors: **Dimitry G. Grabbe**, Middletown; **Iosif Korsunsky**, Harrisburg, both of Pa.

[73] Assignee: **AMP Incorporated**, Harrisburg, Pa.

[21] Appl. No.: **891,710**

[22] Filed: **Jul. 31, 1986**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 818,831, Jan. 14, 1986.

[51] **Int. Cl.**[4] **H01R 23/72**

[52] **U.S. Cl.** **439/71**; 439/680; 439/862

[58] **Field of Search** ..... 339/17 CF, 176 MP, 186 R, 339/186 M, 17 M, 252 R, 258 R, 258 P

[56] **References Cited**

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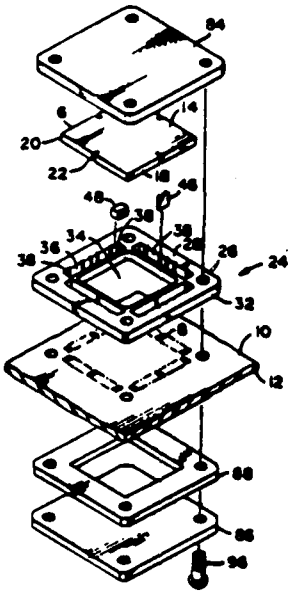
IBM Bulletin, Dust, vol. 15, No. 1, p. 108, 6-1972.

Primary Examiner—Neil Abrams
Attorney, Agent, or Firm—Bruce J. Wolstoncroft; Frederick W. Raring

[57] **ABSTRACT**

Connector for a substrate such as an IC chip carrier comprises a housing assembly which in turn comprises a housing frame and a plurality of contact modules on the frame. Each module has a group of contact members therein. The contact members are located in predetermined positions in the frame and within predetermined dimensional tolerances. The housing frame and the substrate have substrate locating means for locating the substrate so that contact pads on the substrate will be in registry with the contact positions. Module locating means are also provided for locating the modules in the frame so that the contact members in the modules will be located in the predetermined positions. Each module has its own locating means which is directly related to the substrate locating means. The contact members in each module are thereby located within cumulative dimensional tolerances which are limited to the respective modules and are not cumulative beyond the individual modules.

14 Claims, 6 Drawing Figures



United States Patent [19]

Roy, III et al.

[11] **Patent Number: 4,750,147**

[45] **Date of Patent: Jun. 7, 1988**

[54] **METHOD FOR ESTIMATING SIGNAL SOURCE LOCATIONS AND SIGNAL PARAMETERS USING AN ARRAY OF SIGNAL SENSOR PAIRS**

[75] Inventors: **Richard H. Roy, III**, Cupertino; **Arogyaswami J. Paulraj**; **Thomas Kailath**, both of Stanford, all of Calif.

[73] Assignee: **Stanford University**, Stanford, Calif.

[21] Appl. No.: 795,623

[22] Filed: Nov. 6, 1985

[51] Int. Cl.[4] G06G 7/48

[52] U.S. Cl. 364/807; 364/825; 364/801

[58] Field of Search ..... 364/800, 807–808, 364/810, 825, 861, 801–806; 343/5 R, 5 AF, 6 R, 6.5 R, 6.5 LC, 6.5 SS, 450; 367/3–6, 12, 36–38, 43

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Primary Examiner—Gary V. Harkcom
Attorney, Agent, or Firm—Flehr, Hohbach, Test, Albritton & Herbert

[57] **ABSTRACT**

The invention relates generally to the field of signal processing for signal reception and parameter estimation. The invention has many applications such as frequency estimation and filtering, and array data processing, etc. For convenience, only applications of this invention to sensor array processing are described herein. The array processing problem addressed is that of signal parameter and waveform estimation utilizing data collected by an array of sensors. Unique to this invention is that the sensor array geometry and individual sensor characteristics need not be known. Also, the invention provides substantial advantages in computations and storage over prior methods. However, the sensors must occur in pairs such that the paired elements are identical except for a displacement which is the same for all pairs. These element pairs define two subarrays which are identical except for a fixed known displacement. The signals must also have a particular structure which in direction-of-arrival estimation applications manifests itself in the requirement that the wavefronts impinging on the sensor array be planar. Once the number of signals and their parameters are estimated, the array configuration can be determined and the signals individually extracted. The invention is applicable in the context of array data processing to a number of areas including cellular mobile communications, space antennas, sonobuoys, towed arrays of acoustic sensors, and structural analysis.

3 Claims, 2 Drawing Sheets